PROPOSED DECISION

Proposed Denial of Alternative Closure Deadline for Clifty Creek Power Station

SUMMARY:

Indiana-Kentucky Electric Corporation (IKEC) submitted a demonstration (referred to as the "Demonstration" in this document) to the Environmental Protection Agency (EPA) seeking an extension pursuant to 40 C.F.R § 257.103(f)(1) to allow two coal combustion residuals (CCR) surface impoundments, the West Boiler Slag Pond (WBSP) and the Landfill Runoff Collection Pond (LRCP), to continue to receive CCR and non-CCR wastestreams after April 11, 2021, at the Clifty Creek Power Station in Madison, Indiana. EPA is proposing to deny this extension request. In the Demonstration, IKEC requested an alternative closure deadline of December 5, 2022, for the WBSP and April 25, 2023, for the LRCP. EPA is proposing to deny the request for an extension based on a proposed determination that Clifty Creek Power Station has failed to demonstrate that there is no off-site capacity available for one of the wastestreams and that the facility is in compliance with the requirements of 40 C.F.R. 257 subpart D, as required in 40 C.F.R. § 257.103(f)(1)(iii).

DATES: *Comments.* Comments must be received on or before February 23, 2022.

ADDRESSES AND PUBLIC PARTICIPATION: The EPA has established a docket for this notice under Docket ID No. EPA-HQ-OLEM-2021-0587. EPA established a docket for the August 28, 2020, CCR Part A Rule under Docket ID No. EPA-HQ-OLEM-2019-0172. All documents in the docket are listed in the https://www.regulations.gov index. Publicly available docket materials are available either electronically at https://www.regulations.gov or in hard copy at the EPA Docket Center. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m.,

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Monday through Friday, excluding holidays. The telephone number for the Public Reading Room is (202) 566-1744, and the telephone number for the EPA Docket Center is (202) 566-1742. You may send comments, identified by Docket ID. No. EPA-HQ-OLEM-2021-0587, by any of the following methods:

- Federal e-Rulemaking Portal: https://www.regulations.gov/ (our preferred method). Follow the online instructions for submitting comments.
- Mail: U.S. Environmental Protection Agency, EPA Docket Center, Office of Land and Emergency Management, Docket ID No. EPA-HQ-OLEM-2021-0587, Mail Code 28221T, 1200 Pennsylvania Avenue NW, Washington, DC 20460.
- Hand Delivery or Courier (by scheduled appointment only): EPA Docket Center, WJC West Building, Room 3334, 1301 Constitution Avenue NW, Washington, DC 20004. The Docket Center's hours of operations are 8:30 a.m. – 4:30 p.m., Monday – Friday (except Federal Holidays).

Instructions: All submissions received must include the Docket ID No. for this action. Comments received may be posted without change to https://www.regulations.gov/, including any personal information provided. Once submitted, comments cannot be edited or removed from the docket. The EPA may publish any comment received to its public docket. Do not submit electronically any information you consider to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Multimedia submissions (audio, video, etc.) must be accompanied by a written comment. The written comment is considered the official comment and should include discussion of all points you wish to make. The EPA will generally not consider comments or comment contents located outside of the primary submission (i.e., on the web, cloud, or other file sharing system). For additional

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submission methods, the full EPA public comment policy, information about CBI or multimedia submissions, and general guidance on making effective comments, please visit https://www.epa.gov/dockets/commenting-epa-dockets.

Due to public health concerns related to COVID-19, the EPA Docket Center and Reading Room are open to the public by appointment only. Our Docket Center staff also continues to provide remote customer service via email, phone, and webform. Hand deliveries or couriers will be received by scheduled appointment only. For further information and updates on EPA Docket Center services, please visit us online at https://www.epa.gov/dockets.

The EPA continues to carefully and continuously monitor information from the Centers for Disease Control and Prevention (CDC), local area health departments, and our Federal partners so that we can respond rapidly as conditions change regarding COVID-19.

FOR FURTHER INFORMATION CONTACT: For information concerning this proposed decision, contact:

- Kirsten Hillyer, Office of Resource Conservation and Recovery, Materials Recovery and Waste Management Division, Environmental Protection Agency, 1200 Pennsylvania Avenue NW, MC: 5304T, Washington, DC 20460; telephone number: (202) 566-0542; email address: Hillyer.Kirsten@epa.gov.
- Frank Behan, Office of Resource Conservation and Recovery, Materials Recovery and Waste Management Division, Environmental Protection Agency, 1200 Pennsylvania Avenue NW, MC: 5304T, Washington, DC 20460; telephone number: (202) 566-0531; email address: Behan.Frank@epa.gov.
- For more information on coal ash regulations, please visit https://www.epa.gov/coalash.

SUPPLEMENTARY INFORMATION:

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List of Acronyms

ACM – Assessment of Corrective Measures

ASD – alternate source demonstration

bgs – below ground surface

BMcD – Burns & McDonnell

BSHS – boiler slag handling system

CBI – Confidential Business Information

CCR – coal combustion residuals

C.F.R. – Code of Federal Regulations

CY – cubic yards

ELGs – Effluent Limit Guidelines and Standards for the Steam Electric Power Generating Point Source Category

EPA – Environmental Protection Agency

FERC – Federal Energy Regulatory Commission

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FGD – flue gas desulfurization

ft amsl – feet above mean sea level

GWMCA – groundwater monitoring corrective action

ICPA – Inter-Company Power Agreement

IDEM – Indiana Department of Environmental Management

IKEC – Indiana Kentucky Electric Corporation

LRCP – Landfill Runoff Collection Pond

LVWTS – low volume wastewater treatment system

MGD – million gallons per day

MNA – monitored natural attenuation

MW – megawatts

mV - millivolts

NPDES – National Pollutant Discharge Elimination System

ORP – oxidation reduction potential

OVEC – Ohio Valley Electric Corporation

PJM – PJM Interconnection LLC

PRBs – permeable reactive barriers

PSD – prevention of significant deterioration

POTW – publicly owned treatment works

RTO – Regional Transmission Organization

SSI - statistically significant increase

SSL – statistically significant level

WBSP – West Boiler Slag Pond

I. General Information

A. What decision is the agency making?

The EPA is proposing to deny the extension request submitted by IKEC for two CCR surface impoundments, the WBSP and the LRCP, located at the Clifty Creek Power Station in

Madison, Indiana. IKEC submitted a demonstration to EPA seeking an extension pursuant to 40 C.F.R § 257.103(f)(1) to allow the two impoundments to continue to receive CCR and non-CCR wastestreams after April 11, 2021. EPA is proposing that IKEC cease receipt of waste into the two CCR surface impoundments no later than 135 days after EPA issues a final decision.

B. What is the agency's authority for making this decision?

This proposal is being issued pursuant to the authority in 40 C.F.R. § 257.103(f).

II. Background

A. Part A Final Rule

In April 2015, EPA issued its first set of regulations establishing requirements for CCR surface impoundments and landfills (Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities,80 FR 21301) (the "CCR Rule"). In 2020, EPA issued the CCR A Holistic Approach to Closure Part A: Deadline to Initiate Closure rule (85 FR 53516 (Aug. 28, 2020)) (the "Part A Rule"). The Part A Rule established April 11, 2021, as the date that electric utilities must cease placing waste into all unlined CCR surface impoundments. The Part A Rule also revised the alternative closure provisions of the CCR rule (40 C.F.R. § 257.103) by allowing owners or operators to request an extension to continue to receive both CCR and non-CCR wastestreams in an unlined CCR surface impoundment after April 11, 2021, provided that certain criteria are met. EPA established two site-specific alternatives to initiate closure of CCR surface impoundments (40 C.F.R. § 257.103(f)), commonly known as extensions to the date to cease receipt of waste: 1) development of alternative capacity by the April 11, 2021 deadline is technically infeasible (40 C.F.R. § 257.103(f)(1)), and 2) permanent cessation of a coal-fired boiler(s) by a date certain (40 C.F.R. § 257.103(f)(2)).

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The first site-specific alternative to initiate closure of CCR surface impoundments is *Development of Alternative Capacity is Technically Infeasible* (40 C.F.R. § 257.103(f)(1)). Under this alternative, an owner or operator may submit a demonstration seeking EPA approval to continue using its unlined surface impoundment for the specific amount of time needed to develop alternative disposal capacity for its CCR and non-CCR wastestreams. The demonstration must meet the requirements at 40 C.F.R. § 257.103(f)(1). To have an alternative deadline approved, the regulation requires the facility to demonstrate that: 1) no alternative disposal capacity is currently available on or off-site of the facility; 2) the CCR and/or non-CCR waste stream must continue to be managed in that CCR surface impoundment because it was technically infeasible to complete the measures necessary to obtain alternative disposal capacity either on or off-site at the facility by April 11, 2021; and 3) the facility is in compliance with all the requirements of 40 C.F.R. subpart D. 40 C.F.R. §§ 257.103(f)(1)(i)-(iii). To support the requested alternative deadline, the facility must submit detailed information demonstrating that the amount of time requested is the fastest technically feasible time to complete development of alternative disposal capacity. 40 C.F.R. § 257.103(f)(1)(iv)(A).

The second site-specific alternative to initiate closure of CCR surface impoundments is for the owner or operator to demonstrate that it will permanently cease operation of the coal-fired boilers at the facility. *Permanent Cessation of Coal-Fired Boiler(s) by a Date Certain*, (40 C.F.R. § 257.103(f)(2)). Under this alternative, an owner or operator may submit a demonstration seeking EPA approval to continue using an unlined CCR surface impoundment in the interim period prior to permanently stopping operation of coal-fired boiler(s) at the facility. The demonstration must meet the requirements at 40 C.F.R. § 257.103(f)(2). The owner or operator must show that 1) the facility will cease operation of coal-fired boiler(s) and complete

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closure of the CCR surface impoundment(s) by the specified deadlines (no later than October 17, 2023 for impoundments 40 acres, or smaller and no later than October 17, 2028 for impoundments larger than 40 acres); and 2) in the interim period prior to the closure of the coal-fired boiler, the facility must continue to use the CCR surface impoundment due to the absence of alternative disposal capacity both on-site or off-site. *Id*. Unlike the requirements for the first alternative, the owner or operator does not need to develop alternative disposal capacity. The regulations require a demonstration that: 1) no alternative disposal capacity is available on or off-site of the facility; 2) the risks from continued use of the impoundment have been adequately mitigated; 3) the facility is in compliance with all other requirements of 40 C.F.R. part 257 subpart D; and 4) closure of both the impoundment and the coal-fired boiler(s) will be completed in the allowed time. 40 C.F.R. § 257.103(f)(2)(i)-(iv).

B. Clifty Creek Power Station

On November 30, 2020, the Indiana-Kentucky Electric Corporation (IKEC) submitted a Demonstration pursuant to 40 C.F.R. § 257.103(f)(1) (the first alternative) requesting additional time to develop alternative capacity to manage CCR and non-CCR wastestreams at the Clifty Creek Power Station in Madison, Indiana. IKEC is the owner and operator of the Clifty Creek Power Station.

In the Demonstration, IKEC requests an alternative deadline of December 5, 2022, for the WBSP and April 25, 2023 for the LRCP, by which dates IKEC would cease routing all CCR and non-CCR wastestreams to, and initiate closure of, these impoundments.

As described in the Demonstration, IKEC intends to obtain alternative disposal capacity to the Clifty Creek WBSP CCR surface impoundment by: 1) converting its wet handling systems to a concrete settling tank system; and 2) constructing a new composite lined non-CCR low

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volume wastewater treatment system (LVWTS) within the existing footprint of the WBSP. IKEC intends to obtain alternative disposal capacity for the LRCP by constructing a series of composite lined non-CCR wastewater basins within the footprint of the LRCP.

The EPA is providing additional details on the Clifty Creek facility below, including information on the generation capacity of the Clifty Creek Power Station, information on its CCR surface impoundments and landfills, and information on other non-CCR impoundments. This summary is based on information provided in the Demonstration.

1. Coal-fired boilers and generation capacity.

The Demonstration states that Clifty Creek operates six coal-fired generating units with a combined generation capacity of 1,304 net MW.

2. CCR units and CCR wastestreams.

IKEC currently operates three CCR units at Clifty Creek that are subject to the federal CCR regulations. The facility consists of two CCR surface impoundments, the WBSP and the LRCP, and one CCR landfill. The Demonstration states that the approximate surface area of the WBSP is 75 acres and the LRCP is 40 acres. However, previous reports have described the acreage of the LRCP as approximately 91 acres.[1]

The WBSP is an unlined CCR surface impoundment and subject to closure pursuant to 40 C.F.R. § 257.101(a)(1). This provision provides that IKEC must cease placing CCR and non-CCR wastestreams into the unit and either retrofit or initiate closure as soon as technically feasible, but not later than April 11, 2021. The Demonstration contains a certification that the

[1] Section 3 of the 2017 Annual GWMCA Report describes the LRCP as 91 acres.

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Clifty Creek's surface impoundments are in compliance with all location restrictions specified in 40 C.F.R. §§ 257.60 through 257.64.

According to the Demonstration, the primary factor affecting the capacity development schedule at the Clifty Creek Power Station is the need to manage CCR and non-CCR wastestreams throughout construction of the LVWTS in a way that allows the plant to continue to meet the National Pollutant Discharge Elimination System (NPDES) discharge limits. IKEC states that it cannot cease the flow of CCR and non-CCR wastestreams and initiate closure of the WBSP until the concrete settling tank construction is complete, the new lined LVWTS is constructed within the footprint of the WBSP, and the non-CCR wastestreams are rerouted to the new lined LVWTS. The Demonstration explains that a tuning period is planned following construction of the new WBSP tank, and LRCP wastewater treatment system and certain system upsets may necessitate use of the Clifty Creek CCR surface impoundments for boiler slag and landfill runoff collection wastestreams during such events. According to the visual timeline included in the demonstration, these activities are scheduled to be completed by April 25, 2023.

The Demonstration identifies one CCR landfill at Clifty Creek. The landfill is approximately 40 acres in size; the landfill stormwater runoff and leachate management systems will be a part of the LRCP wastewater treatment system once it is operational.

III. EPA Analysis of Demonstration

The EPA has determined that the Demonstration IKEC submitted pursuant to 40 C.F.R § 257.103(f)(1) for the two CCR surface impoundments at the Clifty Creek Power Station was complete. EPA is proposing to deny the extension request for a number of reasons. EPA is proposing to deny the extension request with respect to a wastestream (drainage from the fly ash silo and the boiler building) because IKEC failed to adequately demonstrate that there is no off-

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site capacity for this wastestream. EPA is also proposing to deny the extension request because IKEC has not demonstrated that the facility is in compliance with all the requirements of 40 C.F.R. part 257, subpart D. This is based on a failure to meet groundwater monitoring requirements at the facility, failure to meet corrective action requirements, failure of the plans to construct a concrete settling tank to obtain alternative capacity to meet the design requirements in the CCR regulations, and failure to prepare closure plans for the WBSP and LRCP that will ensure closure activities will meet the closure performance standards in the CCR regulations. Therefore, EPA is proposing that the extension request be denied.

EPA is proposing for IKEC to cease placement of all CCR and non-CCR wastestreams into the WBSP and LRCP no later than 135 days from the issuance of EPA's final decision discussed in Unit IV.

A. Evaluation of IKEC's Claim of No Alternative Disposal Capacity On or Off-Site

To obtain an extension of the cease receipt of waste deadline, the owner or operator must demonstrate that there is no alternative disposal capacity available on or off-site. 40 C.F.R. § 257.103(f)(1)(iv)(A). As part of this, facilities must evaluate all potentially available disposal options to determine whether any are technically feasible. 40 C.F.R. § 257.103(f)(1)(i). The owner or operator must also evaluate the site-specific conditions that affected the options considered. 40 C.F.R. § 257.103(f)(1)(iv)(A)(*1*)(*i*). Additionally, the regulations prohibit the owner or operator from relying on an increase of cost or inconvenience of existing capacity as a basis for meeting this criterion. 40 C.F.R. § 257.103(f)(1)(i).

The Demonstration must substantiate the absence of alternative capacity for each wastestream that the facility is requesting to continue placing in the CCR surface impoundment beyond April 11, 2021. 40 C.F.R. § 257.103(f)(1)(iv)(A)(*1*). As soon as alternative capacity is

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available for any wastestream, the owner or operator must use that capacity instead of the unlined CCR surface impoundment. 40 C.F.R. § 257.103(f)(1)(v). This means that if there is a technically feasible option to reroute any of the wastestreams away from the surface impoundment, the owner or operator must do so. 40 C.F.R. § 257.103(f)(1)(ii), (v). In the CCR Part A Rule preamble, EPA acknowledged that some of these wastestreams are very large and will be challenging to relocate, especially for those that are sluiced. However, the smaller volume wastestreams have the potential to be rerouted to temporary storage tanks. In such cases, the owner or operator must evaluate this option, and, if it is determined to be technically feasible, must implement it. 85 Fed. Reg. 53,541.

IKEC stated it requires the use of both the LRCP and the WBSP after April 11, 2021, due to the wastestreams that each of them handles. The LRCP is used to manage the stormwater from the western portion of IKEC's landfill and from off-site watershed. The WBSP receives boiler slag, boiler room sump, air heater wash flows, flue gas desulfurization (FGD) wastewater from the treatment system, coal yard sump flows, drainage from the fly ash silo and blower building, FGD waste sump, stormwater runoff, and leachate from the eastern portion of IKEC's landfill. Due to the number and the volume of the flows of the wastestreams that are currently managed in the WBSP, IKEC stated that it was unable to cease these flows prior to April 11, 2021.

1. Lack of Alternative On-site Capacity

IKEC concluded that there was no additional capacity available on-site for any of the wastestreams currently managed in the LRCP or the WBSP. EPA is proposing to agree with this conclusion.

The LRCP receives only stormwater runoff from the western portion of the landfill, as well as stormwater flow from more than 500 acres of watershed. According to the

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Demonstration, the average amount of stormwater the LRCP receives is 0.796 million gallons per day (MGD) with an estimated 6.18 MGD for a 10-year, 24-hour storm. There is currently no other disposal unit on-site with sufficient capacity to handle the stormwater. Due to the size of this wastestream, the high variability with which it occurs, and the lack of other existing capacity, EPA agrees that IKEC could not reroute the stormwater to a different location on-site. EPA also agrees that temporary storage tanks would not work for these wastestreams due to the potentially large volumes of the waste and the area of the watershed runoff that cannot be captured in a tank.

The WBSP currently manages one CCR wastestream, boiler slag, and a variety of non-CCR wastestreams. The boiler slag is sluiced using boiler slag transport water to the WBSP at an average flowrate of 2.9 MGD. The WBSP manages a variety of non-CCR wastestreams with the following average flows: boiler room sump (7.98 MGD), air heater wash flows (N/A, outage flow only), FGD wastewater treatment system (0.37 MGD), coal yard sump (0.04 MGD), drainage from fly ash silo and blower building (0.10 MGD), FGD waste sump (0.03 MGD), and stormwater runoff and leachate from east portion of landfill (0.14 MGD). IKEC stated the only disposal capacity currently available on-site with sufficient capacity to manage the combined wastestreams is the WBSP and that IKEC lacks the space to install a temporary settling tank on the property for the boiler slag and the non-CCR wastestreams. IKEC stated that if it were to use a temporary solution to allow the WBSP to be removed from service, it would require 550 frac tanks per day to manage the volume of waste (not including stormwater contributions). The Demonstration also stated that it would require significant site development for containment measures and that the attendant interconnecting piping would pose an unacceptable amount of potential leaks. Additionally, IKEC stated that due to the solids content, five of these frac tanks

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would need to be replaced daily. EPA is proposing to determine that these are reasonable conclusions, and that they appear to be supported by the documentation submitted with the Demonstration; therefore, EPA proposes to find that there is no available on-site capacity to accept the WBSP wastestreams.

2. Lack of Off-site Alternative Capacity

IKEC concluded that off-site alternative capacity was not a technically feasible option for the CCR or non-CCR wastestreams generated at Clifty Creek. EPA is proposing to disagree with that conclusion, on the grounds that IKEC failed to adequately demonstrate that off-site alternative capacity is not available for each wastestream.

IKEC stated that it is not feasible to provide off-site treatment or disposal of the large volume of non-CCR wastestreams currently routed to the WBSP and LRCP. Off-site disposal of these sluiced CCR and non-CCR wastestreams would require both on-site temporary storage and significant daily tanker traffic. The LRCP and the WBSP currently only receive wet generated wastestreams ranging in volume from 0.04 to 7.8 MGD. Because the wastestreams are wet generated, IKEC evaluated the feasibility of trucking the wastestreams off-site. IKEC provided the daily tanker trucks requirements (assuming 7,500 gallon capacity per truck) for each CCR and non-CCR wastestream (Table 1).

Table 1: CCR and non-CCR wastestreams and daily trucks required

Wastestream	Flowrate (MGD)	Trucks per day (approximate)	Notes
Boiler slag sluice to WBSP	2.90	380	If a POTW[2] could be identified
Boiler room sump flows to WBSP	7.95	1,060	

[2] POTW – publicly owned treatment works

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FGD wastewater treatment system flows to WBSP	0.37	50	
Coal yard sump flows to WBSP	0.04 – 5.60	5 increasing to 740 during rain events	
Drainage from fly ash silo and blower building	0.10	13	
Stormwater runoff leachate from east portion of landfill to WBSP	0.14 – 1.94	18 increasing to 250 during rain events	
Landfill leachate and stormwater runoff from west portion of landfill to LRCP	0.796 – 6.18	106 increasing to 820 during rain events	

As seen in the table, the number of trucks required per day per wastestream varied from 5 to 1,060. IKEC stated that the significant daily tanker truck traffic (over 1,600 trucks and over 3,300 during rain events) for off-site disposal would result in increased potential for safety and noise impacts and further increases to fugitive dust, greenhouse gas emissions and carbon footprint that may require a Prevention of Significant Deterioration (PSD) permit and modification under the Clean Air Act Permit Program if the calculated increases in emissions are over the PSD limits. IKEC additionally stated that the increased truck traffic would be challenging to plan for and reliably perform at Clifty Creek, regardless of whether suitable disposal locations can be identified. IKEC stated that in order to truck the wastestreams off-site they would also need temporary storage tanks and a POTW to accept the wastestreams. IKEC further stated that setting up contractual arrangements for a local POTW to accept the wastewater would prove to be difficult because they also have to meet NPDES discharge limits. Additionally, the temporary wet storage needed to accommodate off-site disposal would require

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reconfiguration, design, installation, and associated environmental permitting that would extend the overall compliance schedule. IKEC stated that the NPDES outfall permit would need to be modified for the WBSP due to eliminating the flows to the surface impoundment if the wastestreams were to be trucked off-site. Therefore, IKEC determined that diverting the wastestreams off-site is not possible and they all need to continue to be managed on-site.

It is EPA's understanding of the Demonstration that IKEC evaluated the off-site disposal capacity options for all the wastestreams together rather than evaluating the potential for each individual wastestream to be sent off-site for disposal. This alone would be a basis for denial. As stated in the Part A final rule preamble, "[T]he final rule requires owners and operators to cease using the CCR surface impoundment as soon as feasible, to document the lack of both on and off-site capacity for each individual wastestream, and expressly requires that as capacity for an individual wastestream becomes available, owners or operators are required to use that capacity…" (85 FR 53541). See, 40 CFR 257.101(a)(1); 257.103(f)(1)(iv)(A)(1); (v). IKEC also provided no evidence that it attempted to find a POTW that could accept any of the individual wastestreams. Based on this, EPA is proposing to find that IKEC did not properly evaluate the possibility of trucking each individual wastestream off-site (such as the fly ash silo and boiler building flows) to a POTW.

There are a few wastestreams that based on volume alone could theoretically be diverted to an off-site POTW. With regard to the coal yard sump flows, EPA considers it is reasonable for a facility to divert a wastestream off-site using five trucks per day. However, during a rain event, 740 trucks per day would be required to divert the waste off-site; EPA considers this to be unreasonable. This would require approximately 32 trucks per hour for 24 hours per day. For the drainage from the fly ash silo and boiler building, EPA believes it is also reasonable that this

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wastestream could in theory be diverted off-site, based on IKEC's estimate that it would take 13 trucks per day. EPA also considers that the FGD wastewater treatment system flows could also potentially be diverted off-site, based on the estimates that it would take roughly 2 trucks per hour. As part of analyzing the Demonstration, EPA evaluated facilities in a 50-mile radius of Clifty Creek to which the wastestreams could potentially be diverted. EPA found 30 facilities with an industrial wastewater permit. IKEC failed to demonstrate that none of these facilities could accept any individual wastestream. EPA was unable to independently confirm that no off-site location could accept these wastestreams because the Demonstration contained no information on the chemical compositions of the wastestreams and the processing capabilities of the facilities. Finally, IKEC provided no documentation substantiating the claim that every individual wastestream must continue to be managed in the impoundments to ensure compliance with its NPDES permit.

Based on the above, EPA is proposing to conclude that IKEC did not provide sufficient evidence that each of its different wastestreams needs to continue to be managed in the CCR surface impoundments. Nor did IKEC provide sufficient evidence that an off-site facility is not available to process all of its wastestreams. EPA cannot confirm IKEC's conclusion that it is infeasible to manage its wastestreams off-site. Therefore, EPA is proposing to determine that IKEC has failed to demonstrate that there is no capacity available off-site for its wastestreams.

B. Evaluation of IKEC's Analysis of Adverse Impacts to Plant Operations

In the Part A Rule, EPA stated that it is important for the facility to include an analysis of the adverse impacts to the operation of the power plant if the CCR surface impoundment could not be used after April 11, 2021. EPA stated that this is an important factor in determining whether the disposal capacity of the CCR surface impoundment in question is truly needed by

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the facility. EPA required that a facility provide analysis of the adverse impacts that would occur to plant operations if the CCR surface impoundment in question were no longer available. 40 C.F.R. § 257.103(f)(1)(iv)(A)(*1*)(*ii*). EPA is proposing to find that there would be adverse impacts to the power plant if the CCR impoundment could not be used after April 11, 2021.

In the Demonstration, IKEC stated that it sells the entire generating capacity to its parent company Ohio Valley Electric Corporation (OVEC) at cost under the Federal Energy Regulatory Commission (FERC) approved OVEC-IKEC Power Agreement, and such capacity is exclusively committed and available to OVEC's owners or their affiliates (the Sponsoring Companies) under the terms of the FERC-approved Inter-Company Power Agreement (ICPA). Under the ICPA, the Sponsoring Companies are responsible for their share of OVEC's costs and expenses, including for debt and other long-term obligations. This agreement went into effect on August 11, 2011 and extends through June 30, 2040. OVEC is a member of the PJM Interconnection LLC (PJM) Regional Transmission Organization (RTO).

IKEC additionally stated that the CCR impoundments at Clifty Creek are the primary component of the existing wastewater treatment systems. According to the Demonstration, if the facility were to be forced to stop using the CCR surface impoundments, the Clifty Creek Power Station would be forced to cease operation. Therefore, the Sponsoring Companies would not receive their allocation of the electric capacity and energy from Clifty Creek to supply electricity to their retail public utility and electric power cooperative customers in Indiana and many neighboring states. IKEC further stated in the Demonstration that a cessation of operations at the Clifty Creek Power Station could cause increased and accelerated costs to OVEC and IKEC, including accelerated costs of demolition and decommissioning of the Clifty Creek Power Station. In addition, IKEC stated that an unplanned loss of such generating capacity might

negatively impact grid stability and power markets in the PJM and surrounding regions. IKEC then concluded that in order to continue to operate, generate electricity, and ultimately comply with the CCR rule, the ELGs, and the facility's NPDES permit conditions, the Clifty Creek Power Station must continue to use both the WBSP and the LRCP.

EPA proposes to find that if Clifty Creek were unable to continue using the CCR surface impoundments, and if no other on or off-site alternative capacity is available, there would be adverse impacts on the ability to run the associated boiler(s) such that a planned temporary outage would likely be required. As discussed in Unit IV, EPA disagrees with IKEC's claims regarding the broader impact of such an outage.

C. Evaluation of IKEC's Site-Specific Analysis for the Alternative Capacity Selected

To support the alternative deadline requested in the demonstration, the facility must submit a workplan that contains a detailed explanation and justification for the amount of time requested. 40 C.F.R. § 257.103(f)(1)(iv)(A). The written workplan narrative must describe each option that was considered for the new alternative capacity selected, the time frame under which each potential capacity could be implemented, and why the facility selected the option that it did. *Id.* 40 C.F.R. § 257.103(f)(1)(iv)(A)(*1*). The discussion must include an in-depth analysis of the site and any site-specific conditions that led to the decision to implement the selected alternative capacity. 40 C.F.R. § 257.103(f)(1)(iv)(A)(*1*)(*i*).

In this section, EPA explains why it is proposing to agree with IKEC's determination that certain alternate capacity options were not feasible and summarizes the option selected by IKEC.

1. Review of Alternative Capacity Options

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IKEC reviewed the various alternative capacity options EPA used in developing the Part A Rule and conducted an analysis of their feasibility at Clifty Creek. *See Table 2-4 of the Demonstration*. In this table IKEC used the average development time EPA calculated for each of the alternative capacity options (see 85 FR 53534) and discussed whether each alternative would be feasible at the site. IKEC determined that two methods were not technically feasible at Clifty Creek: a new surface impoundment and a temporary treatment system. EPA is proposing to agree with this determination.

IKEC determined that a new surface impoundment was not possible due to real estate constraints. Clifty Creek Power Station is bound by the Ohio River to the south, Crooked Creek and a golf course to the east, Indiana Highway 56 to the north, and farmland and residential areas to the west. The site is also bisected by Clifty Creek and a limestone ridge known as the Devil's Backbone. Figure 3 in Appendix A of the Demonstration provided additional detail of the existing site conditions, including the property boundaries, floodplain limits, and topography, as well as the proposed settling tank, LVWTS, and landfill pond footprints. IKEC stated that it is also not possible to construct a new lined LVWTS with associated piping, chemical feed, and power supply that is large enough to receive non-CCR wastestreams and be outside the existing WBSP footprint. Additionally, by constructing the new, lined LVWTS within the existing footprint of the WBSP, IKEC asserted that the Clifty Creek Station would avoid impacts to waters of the United States and other natural resources in the Clifty Creek watershed as part of this project.

IKEC determined a temporary treatment system would also not be technically feasible because Clifty Creek could not build a system that could handle a flowrate of 9.6 MGD.

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Additionally, Clifty Creek lacks the real estate space to build such a system, as explained previously.

IKEC determined that retrofitting the CCR impoundments was technically feasible but did not select this option. IKEC stated that retrofitting would extend the compliance schedule for the WBSP, although IKEC did not provide information on how much additional time would be needed in order to retrofit. According to the Demonstration, the additional time would be needed to completely remove all the CCR from the impoundment while continuing to use the area for disposal of both CCR and non-CCR wastestreams.

Ultimately IKEC determined that the best option is a multiple technology system composed of a concrete settling tank system and wastewater treatment system for its boiler slag and a series of non-CCR wastewater basins, along with a wastewater treatment system.

EPA is proposing to conclude that IKEC adequately evaluated their site-specific limitations. Based on the review of the maps provided by IKEC, it appears that the facility has insufficient space to build outside of the existing CCR surface impoundment footprints. EPA reviewed satellite images and the figures provided in the Demonstration and these show that there is very limited undeveloped real estate currently available on the facility's property.

2. Detailed description of selected alternatives

The detailed descriptions below have been excerpted from the Demonstration.

(a) Alternative Disposal Capacities for the WBSP

The new solid waste management units that are being constructed within the footprint of the WBSP are a concrete settling tank (also referred to as the Boiler Slag Handling System (BSHS)) and the LVWTS. Prior to the start of construction, IKEC will reroute the wastestreams

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to the southern portion of the WBSP. Once wastestreams are rerouted, it will begin to dewater the northern areas of the WBSP where the new disposal capacities will be constructed.

The concrete settling tank will consist of three chambers that are sized to settle boiler slag material and mill rejects from the sluice water. Overflow from the chambers will collect in a recycle tank for recirculation back through the boiler slag sluicing system. The system will operate with sluice water being directed to one of the chambers, with the second chamber being dewatered and cleaned of boiler slag material, and the third chamber in waiting to receive sluice flows or upset flows if needed.

The concrete settling tank will be constructed over CCR material. The footprint of the tank will be preloaded prior to installing the concrete structure to consolidate the material and reduce the potential for differential settlement and the resulting cracking of the tank. The pre-loading (aka surcharge loading) is to consolidate the CCR material and subgrade soils in the area. The schedule is based on the contractor placing approximately 140,000 cubic yards (CY) of CCR material as part of the surcharge effort. After the surcharge material is placed, it will remain for about two months. The contractor will then excavate approximately 75,000 CY of the surcharge material as required to support the new concrete settling tank foundation structure. The contractor will then construct the concrete settling tank and recycle tank floor and walls along with supporting system foundations. The contractor will then backfill the settling tank after the walls are complete. Following this, the contractor will install the stack out slab area. Lastly the contractors will install the mechanical and electrical systems and equipment needed for the tank. During the construction of the tank, the contractor will also begin working on the construction of the LVWTS.

The tank is being designed to meet ACI 350-06 requirements for water-retaining concrete structures with normal environmental exposure (exposure to liquids with a pH greater than 5, or exposure to sulfate solutions 1,000 ppm or less).

The LVWTS is a series of basins that are designed to manage the non-CCR wastestreams. The north basin (i.e., primary basin) is currently sized to handle 4 million gallons of air heater wash with additional storage for a 50-year, 24-hour storm event and 2 feet of dead storage for solids accumulation. The south basin (i.e., secondary basin) is sized to provide 24 hours of retention time at the average daily flow rate. The LVWTS will discharge to the Ohio River through a new NPDES outfall. The two basins will operate in series except during air heater wash events where wash water will be directed to the primary basin and all other flows will be directed to the secondary basin. The LVWTS will also be constructed over CCR material in order to minimize the overall compliance schedule by limiting the amount of borrow material required to complete the project and to balance cut and fill within the existing basin. The contractor will regrade approximately 350,000 CY of CCR material in the construction area for the LVWTS. Furthermore, removing all the CCR material from the WBSP and constructing a new, lined LVWTS is not feasible while all the CCR and non-CCR wastestreams continue to be routed to the unit. The LVWTS will receive a composite liner system. The footprint of the new LVWTS will be graded and stabilized prior to installing the liner system. In addition to providing containment for the wastestreams discharged to the new LVWTS, the composite liner will also act as a cover system over underlying CCR materials that remain. The composite liner system will likely consist of a geosynthetic clay liner, 60 mil HDPE, geotextile, and 12 inches of suitable fill material. Additionally, 18 inches of riprap will be placed on the pond slopes and a

minimum of 6-inches of concrete will be placed over the bottom of the primary basin to facilitate cleanout.

(b) Alternative Disposal Capacities for the LRCP.

IKEC is planning on constructing new non-CCR wastewater basins to manage the landfill leachate and stormwater. The detailed engineering for the new capacities to be built in the LRCP will be conducted while the construction in the WBSP is happening. As stated in the Demonstration, the steps that will happen to construct new capacity are as follows:

- Grading in a new stormwater ditch to divert off-site runoff around the LRCP to a new stormwater outfall south of the LRCP (approximately 140,000 CY of cut/fill).
- Dredging material from the proposed footprint of the new lined leachate and stormwater treatment systems (approximately 190,000 CY).
- Installing a new berm (approximately 69,000 CY of cut/fill) for the west leachate collection pond upstream of the leachate and stormwater treatments systems. The collection pond (5.8 acres) will accept landfill flows during construction of the treatment systems and will receive a composite liner system consisting of a geosynthetic drainage layer, GCL, flexible membrane liner geotextile, and 12-inch protective cover layer. The collection pond will eventually overflow to the treatment pond.
- Installing a new berm (approximately 60,000 CY of cut/fill) within the footprint of the dredged area for the sediment pond. The sediment pond (6.6 acres) will also receive a composite liner system as described for the leachate collection pond. The sediment pond will overflow to a ditch, which will tie into Outfall 001. The ditch will be constructed in the LRCP closure area and capped with the LRCP cover system.

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- Installing a new berm (approximately 28,000 CY of cut/fill) within the footprint of the dredged area for the leachate treatment pond. The treatment pond (2.1 acres) will overflow to the sediment pond and will also receive a composite liner system.
- Installing a new leachate collection pond (2.0 acres) on the east side of the landfill. The new perimeter berm will require approximately 18,000 CY of cut/fill and will also receive a composite liner system. The east leachate collection pond will have the capability to overflow via an internal outfall to stormwater ditches that will be incorporated into the WBSP closure design.
- Once the landfill ponds are in place, the remaining LRCP area may be closed. IKEC will continue to work so as to expedite the ultimate closure of the LRCP and will provide regular updates per the requirements of the CCR Rule.

D. Evaluation of IKEC's Justification for Time Requested

Facilities must justify the amount of time requested in the demonstration as the fastest technically feasible time to develop the selected alternative disposal capacity. 40 C.F.R. § 257.103(f)(1)(iv)(A)(*1*)(*iii*). The workplan must contain a visual timeline and narrative discussion to justify the time request. 40 C.F.R. § 257.103(f)(1)(iv)(A)(*3*). The visual timeline must clearly indicate how each phase and the steps within that phase interact with or are dependent on each other and the other phases. Additionally, any possible overlap of the steps and phases that can be completed concurrently must be included. This visual timeline must show the total time needed to obtain the alternative capacity and how long each phase and step is expected to take. The detailed narrative of the schedule must discuss all the necessary phases and steps in the workplan, in addition to the overall time frame that will be required to obtain capacity and cease receipt of waste. The discussion must include: 1) why the length of time for each phase and

step is needed, 2) why each phase and step must happen in the order it is occurring, 3) a discussion of the tasks that occur during the specific step, and 4) the tasks that occur during each of the steps within the phase. 40 C.F.R. § 257.103(f)(1)(iv)(A)(*3*). This overall discussion of the schedule assists EPA in understanding whether the time requested is warranted. Finally, facilities must include a narrative on the progress made towards the development of alternative capacity as of the time the demonstration was compiled. 40 C.F.R. § 257.103(f)(1)(iv)(A)(*4*). This section of the Demonstration is intended to show the progress and efforts the facility has undertaken to work towards ceasing placement of waste in the CCR surface impoundment and to determine whether the submitted schedule for obtaining alternative capacity was adequately justified at the time of submission.

IKEC requested an alternative deadline of December 5, 2022, for the WBSP and April 25, 2023, for the LRCP. IKEC stated the primary driver of the time requested is that it will need to continue to manage the wastestreams within the WBSP and the LRCP, while constructing the new systems within the footprints of these two CCR surface impoundments and operating in such a way that will allow Clifty Creek to meet the NPDES discharge limits. IKEC believes the requested alternative closure deadlines are the fastest "technically feasible" as that term is defined at 40 C.F.R § 257.53. EPA proposes to find that these deadlines are the fastest technically feasible for the plans presented.

IKEC began by working with Burns McDonnell (BMcD) on the initial engineering and design for the project to put out for subcontracts and to submit permit applications to the Indiana Department of Environmental Management (IDEM). IKEC stated it will need to secure both modifications to its existing NPDES permit and new permits prior to installing the concrete settling tanks, the LVWTS and the associated non-CCR wastestream piping reroutes, and

chemical feed systems, as well as securing permits for the WBSP closure. IKEC allowed six months for permitting to happen concurrently with other tasks. However, the permit modifications must be completed before the construction associated with the concrete settling tanks, WBSP closure, and the new LVWTS. Since submission of the Demonstration, EPA has spoken with IDEM about the permits for the closure plans. On May 17, 2021 IDEM approved the Phase I Closure Plan for the WBSP. IKEC filed for a petition for review of this approval on June 1, 2021. EPA is unaware if IDEM has received the Phase II Closure Plan for the WBSP. IDEM is actively working with IKEC to reach an agreement on the Phase I Closure Plan.

In the Demonstration, IKEC stated that it has made considerable progress in obtaining alternative capacity. IKEC, Stantec (an engineering consultant), and BMcD have gone through multiple iterations of the project and cost estimating of the best compliance solution for the plant. BMcD and IKEC have completed the project scope and cost estimate development efforts, have selected a preferred compliance solution for the plant, and are finalizing the contracting approach. IKEC has also completed water sampling efforts and preliminary design for the BSHS, laser scans have been completed in the boiler areas, and the BSHS geotechnical investigation. IKEC additionally stated that it did not have a closure trigger for the WBSP prior to the finalization of the Part A Rule. The LRCP did trigger closure due to the detection of a statistically significant level (SSL) of a constituent in Appendix IV to 40 C.F.R. part 257 above a groundwater protection standard. IKEC also stated in the Demonstration that it paused its CCR/ELG compliance strategy until the final rules were published to know the full extent of the impact of these rules.

EPA compared these statements in the narrative of the Demonstration to the visual timeline. The visual timeline shows that the Budgetary and Front-end Engineering Design

(FEED) Study lasted from May 26, 2020, until November 16, 2020. Most of this time was used to conduct the initial geotechnical investigation (80 days). However, the timeline does not show the multiple iterations of the planning, designing, and cost estimating efforts of the new capacity that was indicated in the narrative. Therefore, IKEC likely started planning earlier than shown on the visual timeline.

Based on all the above, EPA proposes to find that the construction time frames for the plans are reasonable. Given the chosen methods for obtaining alternative capacity for the wastestreams, the time frames requested appear to be the fastest "technically feasible." Several of the tasks are happening concurrently and little to no time is wasted by waiting for the next step to occur. Therefore, EPA is proposing to find that the requested deadlines of December 5, 2022, and April 25, 2023, for the WBSP and LRCP respectively, are the fastest technically feasible for the development plans presented.

E. Evaluation of IKEC's Compliance Documentation

The Part A Rule requires that a facility must be in compliance with all the requirements in 40 C.F.R. part 257, subpart D in order to be approved for an extension to the cease receipt of waste deadline. 40 C.F.R. § 257.103(f)(1)(iii). Various compliance documentation must be submitted with the demonstration for the entire facility, not just for the CCR surface impoundment in question. 40 C.F.R. § 257.103(f)(1)(iv)(B). Additionally, EPA evaluated the information presented in the narrative relating to the closure or retrofit of the impoundment and the development of the new alternative disposal capacities to ensure compliance with the CCR regulations.

The first group of compliance documents required to be included in the Demonstration are related to documentation of the facility's current compliance with the requirements governing

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groundwater monitoring systems. The Agency required copies of the following documents: 1) map(s) of groundwater monitoring well locations (these maps should identify the CCR units as well); 2) well construction diagrams and drilling logs for all groundwater monitoring wells; 3) maps that characterize the direction of groundwater flow accounting for seasonal variation; 4) constituent concentrations, summarized in table form, at each groundwater monitoring well monitored during each sampling event; and 5) description of site hydrogeology including stratigraphic cross-sections. 40 C.F.R. §§ 257.103(f)(1)(iv)(B)(*2*)-(*4*).

The second group of documents EPA required was the facility's corrective action documentation, if applicable, and the structural stability assessments. A facility must submit the following documentation: the corrective measures assessment required at 40 C.F.R. § 257.96, progress reports on remedy selection and design; the report of final remedy selection required at 40 C.F.R. § 257.97(a); the most recent structural stability assessment required at 40 C.F.R. § 257.73(d), and the most recent safety factor assessment required at 40 C.F.R. § 257.73(e). 40 C.F.R. §§ 257.103(f)(1)(iv)(B)(*5*) through (*8*).

1. Construction of New Units

EPA has preliminarily identified several areas in which IKEC's proposal for constructing alternative capacity appear not to comply with the CCR regulations, including those applicable to the construction of new CCR surface impoundments. EPA is proposing to determine that IKEC has failed to demonstrate compliance with 40 C.F.R. § 257.103(f)(1)(viii).

(a) Construction of new CCR surface impoundments. The concrete settling tanks that IKEC plans to build appear to be a CCR surface impoundment, but IKEC has not demonstrated that the tanks meet the requirements for constructing a new CCR surface impoundment found at 40 C.F.R. § 257.72. 40 C.F.R. § 257.103(f)(1) provides that in order to be approved, a facility

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must demonstrate compliance with all of the requirements of that subsection. One of those requirements is that a facility must maintain compliance with all of subpart D. 40 C.F.R. § 257.103(f)(1)(viii). Based on the plans for construction of the alternative disposal capacity that, among other things, fails to include a composite liner in contravention of 40 C.F.R. § 257.72, EPA is proposing that IKEC has failed to meet this requirement. EPA will not approve a request for an extension that would subsequently be automatically revoked by operation of the regulation (e.g., during the tuning period).

The CCR regulations at 40 C.F.R. § 257.53 define a CCR surface impoundment as "a man-made excavation, or diked area, which is designed to hold an accumulation of CCR and liquids, and the unit treats, stores, or disposes of CCR." Based on the information contained in the narrative, the proposed concrete settling tanks would appear to fall squarely within this definition.

In the narrative of the Demonstration, IKEC stated that

> "The contractor will dewater the north portion of the WBSP and place CCR material within the footprint of the concrete settling tank as required to support preparation of the subgrade. This area requires pre-loading (i.e. surcharge loading) to consolidate the CCR material and subgrade soils in the area. …The schedule duration is based on the contractor placing approximately 140,000 CY of CCR material as part of the surcharge loading effort. …The contractor will then excavate approximately 75,000 CY of the surcharge material to support the new concrete settling tank foundation construction. The contractor will construct the concrete settling tank and recycle tank floor and walls along with supporting system foundations. …The contractor will backfill the settling tank after the walls are complete."[3,4] See page 2-21 and 22 of the Demonstration.

[3] Although the Demonstration does not specify the CCR that will be used, EPA assumes that it will be CCR already in the WBSP. 40 C.F.R. § 257.101(a).
[4] IKEC stated this in the Demonstration submitted to EPA on November 30, 2020.

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Based on this description and the accompanying diagrams, EPA interprets this to mean that the tank is partially below grade and surrounded by CCR material. In other words, this would be a man-made depression. In addition, the concrete settling tank will contain both boiler slag (a "CCR" under the definition in 40 C.F.R. § 257.53) and water. Finally, according to the Demonstration, the concrete settling tanks will be used to treat or store the boiler slag sluice water to remove the solids prior to flowing to the LVWTS. See page 2-15 of the Demonstration ("The concrete settling tanks will consist of three chambers, as shown in Figure 2 in Appendix A, which are sized to settle boiler slag material and mill rejects from the sluice water. Overflow from the chambers will collect in a recycle tank for recirculation back through the boiler slag sluicing system"). The conclusion that treatment is occurring is consistent with EPA's general view that concrete settling tanks are wastewater treatment systems. See, 85 FR 53526.

As a new CCR surface impoundment, the unit must comply with 40 C.F.R. § 257.72, which requires the installation of a composite liner as specified in the regulation. There is no discussion in the narrative of any plans to install such a liner beneath the concrete settling tanks. Further, the unit will need to comply with the groundwater monitoring requirements at 40 C.F.R. §§ 257.90-257.95. Of particular importance here would be the need to comply with the requirements of 40 C.F.R. § 257.91 relating to the placement and design of the groundwater monitoring system. Because the concrete basin would be constructed within a smaller footprint within the larger WBSP, reliance on the existing downgradient monitoring wells may not comply with the requirement that downgradient wells be placed at the current waste boundary. 40 C.F.R. § 257.91(a)(2). Based on the information provided, EPA cannot determine whether the design complies with these requirements. Moreover, it appears that under the current design, CCR from the closed WBSP would remain under the new basin; if this is accurate, it is not apparent how

the wells could be properly placed and constructed to avoid contamination from CCR consistent with 40 C.F.R. § 257.91(e).

2. Closure of WBSP and LRCP

The regulations provide two options for closing a CCR unit: closure by removal and closure with waste in place. 40 C.F.R. § 257.102(a). Both options establish specific performance standards. 40 C.F.R. § 257.102(c)-(d). IKEC intends to close both the WBSP and the LRCP by closing with waste in place. Based on the available information, EPA is proposing to determine that IKEC has not adequately demonstrated compliance with the closure regulations at 40 C.F.R. § 257.102(b) and (d), as required by 40 C.F.R. § 257.103(f)(1)(iii).

EPA evaluated the information provided in the Demonstration, as well as in the written closure plans and other documents posted on IKEC's publicly accessible CCR website for the WBSP and the LRCP. After review of this information, EPA is proposing to determine that IKEC has not documented how the closure performance standards will be achieved. There are no details in the closure plan posted on IKEC's CCR website or any other document provided as part of the Demonstration that will allow EPA to determine that the closure performance standards will be met, in light of site conditions, at the impoundments. Therefore, EPA is proposing that IKEC has not adequately demonstrated compliance with the closure regulations at 40 C.F.R. § 257.102(b) and (d), as required by 40 C.F.R. § 257.103(f)(1)(iii).

(a) Final Cover System of the WBSP and LRCP. IKEC did not provide enough detail in the Demonstration for EPA to determine whether the closure of these units will meet all the closure performance standards at 40 C.F.R. § 257.102(d). However, based on the information presented in the narrative, it appears that IKEC does not meet the closure performance standards in 40 C.F.R. § 257.102(d)(1)(ii) and (iii): "The owner or operator … must ensure that, at a

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minimum, the CCR unit is closed in a manner that will: … (ii) Preclude the probability of future impoundment of water, sediment, or slurry; [and] (iii) Include measures that provide for major slope stability to prevent the sloughing or movement of the final cover system during the closure and post-closure care period." The designs submitted in the Demonstration for the concrete settling tank, the LVWTS, and the landfill runoff/leachate management ponds show that they are being built into the existing CCR in the closed units and will impound water on the final cover system of the closed WBSP and the LRCP. EPA is therefore proposing to find that the inclusion of the above plans for closure is inconsistent with the plain language of the requirement that to obtain approval, a facility must demonstrate that it will maintain compliance with all the requirements of subpart D. 40 C.F.R. § 257.103(f)(1)(viii).

Similarly, it is not clear from the narrative whether the final cover system for either the WBSP or the LRCP would meet the standards in 40 C.F.R. § 257.102(d)(3). First, IKEC failed to include any information on the final cover system for the entire WBSP. The only mention of a final cover system for the WBSP is in relation to the ditches used to convey flows from the LVWTS and portions of the closed pond to a new outfall structure. According to the narrative, the composite liner system of the new LVWTS is intended to also act as a cover system over the underlying CCR materials that remain. Based on the absence of any discussion, it appears that there will be no separate cover system between the concrete settling tanks and the CCR that will be left in place below it. EPA infers from this that IKEC intends for the concrete settling tanks to serve as the final cover system for this portion of the WBSP.

IKEC also failed to provide any information on the final cover system for the LRCP. According to the narrative, IKEC plans to install a composite liner system under the new landfill leachate ponds; although the narrative fails to specify this to be the case, EPA assumes the intent

is to have the composite liner system serve as the cover for this portion of the LRCP, similar to the plan for the WBSP.

The regulations require that any CCR that is left in place have a final cover system that meets the performance standard in 40 C.F.R. § 257.102(d)(3). The narrative should therefore have included a discussion of the final cover system for the entire WBSP and LRCP.

Second, as noted above, the liner system will not cover the entire surface area of the WBSP and potentially the LRCP. Under the current plan for the WBSP, the entire concrete settling tank system will not contain a composite liner. But the narrative contains no explanation of how this settling tank system, which will be sitting on top of compacted CCR within the footprint of the unit, meets the standards of 40 C.F.R. § 257.102(d)(3). The regulations provide that, "if a CCR unit is closed by leaving CCR in place, the owner or operator must install a final cover system that is designed to minimize infiltration and erosion, and at a minimum, meets the requirements of paragraph (d)(3)(i) of this section, or the requirements of the alternative final cover system specified in paragraph (d)(3)(ii) of this section." 40 C.F.R. § 257.102(d)(3).

Finally, even if IKEC is correct that the composite liner system it intends to install over certain portions of the WBSP and LRCP will meet the performance standards of an alternative cover system under 40 C.F.R. § 257.102(d)(3)(ii), it is not clear that would be sufficient to ensure compliance with the closure standards as a whole. As explained earlier, EPA considers the concrete settling tank to be a CCR surface impoundment that requires a composite liner system. In order to construct a new impoundment on top of a closed impoundment, a facility would need to comply with both the liner requirements in 40 C.F.R. § 257.72 and the closure requirements in 40 C.F.R. § 257.102(d). To ensure the performance standard in both regulations are met, IKEC would need to complete the final cover system first and then build the liner

system above the final cover in a manner that does not disturb or negatively impact the final cover. In addition, EPA is concerned that if the basins that will comprise the LVWTS were to leak, the waste waters would collect on the top of the final cover system, that is, will impound water on top of the cover system in contravention of 40 C.F.R. § 257.102(d)(1)(ii).

Assuming EPA has properly understood IKEC's plans, there are some potential options that might address the compliance concerns. For example, one option would be to construct the new systems fully above the final closure grade of the CCR surface impoundments and have double containment with leak detection systems to prevent damage and impoundment of liquid on the final cover systems. A second potential option would be to close the units by removal prior to constructing the new systems, a process also known as retrofitting.

(b) Intersection between WBSP and Groundwater

EPA reviewed the History of Construction (October 20216), the Dam and Dike Annual Inspection Report (2019), the CCR Location Restrictions, and the 2019 Annual Groundwater Monitoring and Corrective Action (GWMCA) Report from IKEC's publicly accessible CCR compliance website to determine whether the base of the WBSP intersects with groundwater. The following information indicates that, at a minimum, a portion of the CCR in the WBSP is saturated with groundwater.

According to the History of Construction the bottom elevation of the WBSP is at 433.0 feet above mean sea level (ft amsl).[5] The 2019 Dam and Dike Annual Inspection Report states that at present conditions the elevation of CCR is 433 ft amsl and the depth of CCR is 7.5 ft.[6] EPA then used these two numbers to calculate the lower extent of the base elevation of the

[5] Clifty Creek WBSP – History of Construction (October 2016) page 3
[6] 2019 – Clifty Creek Dam and Dike Inspection Report. Page 11

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WBSP to be 425.5 ft amsl. Therefore, EPA has concluded that the lower extent of base elevation of the WBSP is between 425.5 and 433 ft amsl.

EPA then reviewed the WBSP piezometer data, and the groundwater elevations summarized in the Annual GWMCA Report to determine the maximum elevation of the groundwater and compare those elevations to the elevation of the base of the WBSP. The piezometer data from Figure 2 (West Boiler Slag Pond Piezometers Measurements) of the 2019 Dam and Dike Inspection Report[7],[8] show the static groundwater level elevations ranged between approximately 425 ft and 450 ft amsl. Furthermore, this 2019 report shows that maximum readings at each of the four piezometer locations exceeded the lower extent of the base elevation of the WBSP. Table A-3 of the 2019 Annual GWMCA Report[9] shows groundwater elevations range between 419.4 and 470.1 ft amsl for monitoring wells at the waste boundary of the WBSP. Additionally, the CCR Location Restrictions report [10] for the WBSP states that the top of the uppermost aquifer ranges from 397.3 to 453.8 ft amsl for monitoring wells at the waste boundary of the WBSP.

The groundwater elevation is consistently higher than 433 ft amsl, which is the highest reported point of the lower extent base elevation of the WBSP. As a consequence, EPA is proposing to conclude that at least a portion of the CCR within the WBSP is in contact with groundwater, and that there is a hydraulic connection between the uppermost aquifer and the CCR located with the WBSP.

(c) Intersection between LRCP and Groundwater

[7] Three piezometers are located at the crest of the constructed dike and one piezometer is located near the toe of the constructed dike of the WBSP.
[8] 2019 – Clifty Creek Dam and Dike Inspection Report. Page 21
[9] 2019 Clifty Creek CCR Annual Groundwater Monitoring and Corrective Action Report. Page 38
[10] CCR Location Restrictions – Clifty Creek West Boiler Slag Pond – October 17, 2018

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EPA reviewed the History of Construction (October 2016), the Dam and Dike Annual Inspection Report (2019), the CCR Location Restrictions, and the 2019 Annual GWMCA Report from IKEC's publicly accessible CCR compliance website to determine whether the base of the LRCP intersects with groundwater. The following information indicates that, at a minimum, a portion of the CCR in the LRCP is saturated with groundwater.

According to the History of Construction the maximum pool elevation is 501.4 ft amsl and the maximum depth of CCR material is 60 feet.[11] Using these two numbers, EPA calculated that the elevation of the base of the LRCP unit could be located at 441.4 ft amsl. By contrast, the 2019 Dam and Dike Annual Inspection Report states that the elevation of CCR is 475 ft amsl and the depth of CCR is 45 feet[12]. EPA then used these two numbers to calculate the bottom elevation of the LRCP to be 430 ft amsl. Based on these reports it appears that the lower extent of the base elevation of the LRCP is between 430 and 440 ft amsl.

EPA then reviewed the LRCP piezometer data, and the groundwater elevations summarized in the Annual GWMCA Report to determine the maximum elevation of the groundwater and compare those elevations to the elevation of the base of the LRCP. The piezometer data from Figure 4 (Landfill Runoff Collection Pond Piezometers Measurements) of the 2019 Dam and Dike Annual Inspection Report[13] show the static groundwater level elevations to be consistently above 440 ft. Table A-2 of the 2019 Annual GWMCA Report shows groundwater elevations that are greater than 440 ft.[14] Additionally, the CCR Location Restrictions report for the LRCP states "Based on an August 2016 Monitoring Well Installation Report, groundwater elevations measured during these gauging events ranged from

[11] Clifty Creek LRCP – History of Construction (October 2016) page 5
[12] 2019 – Clifty Creek Dam and Dike Inspection Report. Page 13
[13] 2019 – Clifty Creek Dam and Dike Inspection Report. Page 19
[14] 2019 Clifty Creek CCR Annual Groundwater Monitoring and Corrective Action Report. Page 38

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approximately 429 to 497 feet above mean sea level (ft amsl) and ranged from approximately 437 to 452 ft amsl at three monitoring wells located southwest…"[15].

These data show that the groundwater elevations are consistently higher than 440 ft, which is the highest estimated base elevation of the LRCP. Accordingly, it appears that at least a portion of the CCR within the LRCP is in contact with groundwater. EPA is therefore proposing to determine that there is a hydraulic connection between the uppermost aquifer and the CCR located within the LRCP.

(d) Closure in Place Performance Standards.

EPA evaluated the Demonstration and closure-related information on IKEC's CCR website to determine whether IKEC adequately explained how the closure performance standards will be achieved during closure of the WBSP and LRCP in light of the evidence that at least a portion of each CCR surface impoundment appears to be in contact with groundwater. EPA's preliminary determination is that the explanation is inadequate. EPA is therefore proposing to determine that IKEC has failed to meet the requirement to develop an adequate closure plan and to demonstrate that the performance standards will be achieved during closure of the WBSP and the LRCP. 40 C.F.R. §§ 257.102(b), (d)(1)-(2).

The CCR closure requirements applicable to impoundments closing with waste in place include general performance standards and specific technical standards that set forth individual engineering requirements related to the drainage and stabilization of the waste and to the final cover system. The general performance standards and the technical standards complement each other, and both must be met at every site. The general performance standards under 40 C.F.R. § 257.102(d)(1) require that the owner or operator of a CCR unit "ensure that, at a minimum, the

[15] CCR Location Restrictions – Clifty Creek Landfill Runoff Collection Pond – October 17, 2018. Page 11

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CCR unit is closed in a manner that will: (i) Control, minimize or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated run-off to the ground or surface waters or to the atmosphere; and (ii) Preclude the probability of future impoundment of water, sediment, or slurry." The specific technical standards related to the drainage of the waste in the unit require that "free liquids must be eliminated by removing liquid wastes or solidifying the remaining wastes and waste residues" prior to installing the final cover system. 40 C.F.R. § 257.102(d)(2)(i). Finally, the regulations require facilities to develop a written closure plan that describes the steps necessary to close the CCR unit, consistent with recognized and generally accepted good engineering practices. 40 C.F.R. § 257.102(b)(1). The plan must also include a written narrative describing how the unit will be closed in accordance with the section, or in other words, how the closure will meet the performance standards in the regulation. 40 C.F.R. § 257.102(b)(1)(i).

Neither the closure plans posted on IKEC's website nor the Demonstration describe the steps that will be taken to close the CCR units consistent with generally recognized good engineering practices, as required by 40 C.F.R. § 257.102(b). Nor does either document that the closure of the WBSP or the LRCP meets the requirements of 40 C.F.R. § 257.102. For example, the Demonstration provides insufficient details on how free liquids were to be eliminated from either the WBSP and the LRCP, and the October 2016 closure plan for both the WBSP and the LRCP only states that "Free liquid will be removed as part of the final closure of the CCR unit."[16,17] Such a discussion does not meet requirements for a closure plan as laid out in 40 C.F.R. § 257.102(b). And if EPA is correct that the base of the CCR surface impoundments

[16] "Closure Plan, CFR 257.102(b), Landfill Run-off Collection Pond, Clifty Creek Station, Madison, Indiana" October 2016. Page 3.
[17] "Closure Plan, CFR 257.102(b), West Boiler Slag Pond, Clifty Creek Station, Madison, Indiana" October 2016. Page 3.

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intersects with groundwater, the closure plans would need to have discussed the engineering measures taken to ensure that the groundwater had been removed from the units prior to the start of installing the final cover system, as required by 40 C.F.R. § 257.102(d)(2)(i). This provision applies both to the freestanding liquid in the impoundment and to all separable porewater in the impoundment, whether the porewater was derived from sluiced water or groundwater that intersects the impoundment. The definition of free liquids in 40 C.F.R. § 257.53 encompasses all "liquids that readily separate from the solid portion of a waste under ambient temperature and pressure," regardless of whether the source of the liquids is from sluiced water or groundwater.

Similarly, neither the Demonstration nor the closure plans document how the WBSP and the LRCP will be closed in a manner that will "control, minimize or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated run-off to the ground or surface waters or to the atmosphere." 40 C.F.R. § 257.102(d)(1). EPA views the word "infiltration" as a general term that refers to any kind of movement of liquids into a CCR unit. That would include, for example, any liquid passing into or through the CCR unit by filtering or permeating from any direction, including the top, sides, and bottom of the unit. This is consistent with the plain meaning of the term. For example, Merriam-Webster defines infiltration to mean "to pass into or through (a substance) by filtering or permeating" or "to cause (something, such as a liquid) to permeate something by penetrating its pores or interstices." Neither definition limits the source or direction by which the infiltration occurs. In situations where the groundwater intersects the CCR unit, water may infiltrate into the unit from the sides and/or bottom of the unit because the base of the unit is below the water table. In this scenario, the CCR will be in continuous contact with water. This contact between the waste and groundwater provides a potential for waste constituents to be dissolved and to migrate

out of (or away from) the closed units. In this case, the performance standard requires the facility to take measures, such as engineering controls that will "control, minimize, or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste" as well as "post-closure releases to the groundwater" from the sides and bottom of the unit. The Demonstration does not discuss how this performance standard will be achieved for the WBSP and the LRCP, and the October 2016 closure plans for the WBSP and the LRCP states "Post-closure infiltration of liquids into the waste will be controlled through the design of the site grading plan, construction of an engineered cap system, and establishment of stormwater management system in accordance with engineering practices".[18]

In summary, based on available information, EPA cannot determine whether the closure performance standards will be met. This is a violation of 40 C.F.R. § 257.102(b), which requires facilities to develop a written closure plan that documents the steps that will be taken to complete closure and to ensure the performance standards are met. It may also demonstrate that IKEC has failed to comply with the performance standards for closure with waste in place in 40 C.F.R. § 257.102(d). EPA is therefore proposing to determine that IKEC has failed to comply with 40 C.F.R. § 257.102(b), and that IKEC has not demonstrated compliance with the performance standards applicable to the closure of the WBSP and LRCP in 40 C.F.R. § 257.102(d)(1)-(2). EPA is also proposing to find that LKEC's plans for closure are inconsistent with the plain language of the requirement that to obtain approval, a facility must demonstrate that it will maintain compliance with all the requirements of subpart D. 40 C.F.R. § 257.103(f)(1)(viii).

[18] *Id.* Page 2.

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3. Groundwater Monitoring Compliance

The regulations require facilities to submit several groundwater monitoring compliance documents as part of their demonstrations so that EPA can thoroughly evaluate the groundwater monitoring network and the site hydrogeology for every CCR unit at the facility. EPA evaluated the documentation IKEC provided in the Demonstration for Clifty Creek and reviewed the 2017 through 2019 Annual GWMCA Reports. EPA is proposing to determine that the groundwater monitoring systems are inadequate for multiple reasons and therefore do not adequately demonstrate compliance with the regulations. First, groundwater flow characterization is inadequate because there are an insufficient number of groundwater elevation data points surrounding the CCR units to demonstrate groundwater flow direction. Second, an entire downgradient boundary of the multiunit system is unmonitored. Third, the placement of upgradient wells at both the LRCP and the WBSP and the placement of downgradient wells at the LRCP do not comply with 40 C.F.R. § 257.91. Fourth, two background wells appear to be contaminated by CCR and do not accurately represent background groundwater quality for the multiunit system or the WBSP.

Additionally, EPA is proposing to determine that the Alternative Source Demonstrations (ASDs) in the 2019 Annual GWMCA Report fail to meet the requirements of 40 C.F.R. § 257.95(g)(3)(ii) and the Annual GWMCA Reports do not contain all information required by 40 C.F.R. § 257.90(e)(3), including statistical analyses, laboratory analytical reports, and the status of monitoring wells CF-15-01, CF-15-02 and CF-15-03. Finally, EPA is concerned that visual representation of information in the Demonstration is unclear and should be improved in future submittals.

(a) Characterizing Groundwater Quality

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The CCR regulations require facilities to install a groundwater monitoring system that will "accurately represent the quality of background groundwater that has not been affected by leakage from a CCR unit…" and "accurately represent the quality of groundwater passing the waste boundary of the CCR unit." 40 C.F.R. §§ 257.91(a)(1) and (a)(2). In order to design a system that will accurately characterize background groundwater quality upgradient of a CCR unit, as well as at the downgradient waste unit boundary, it is necessary to characterize groundwater flow direction.

A groundwater divide functions as a geologic divide that separates groundwater. Groundwater flows on either side of the divide are independent (e.g., could flow in different directions). As a consequence, independent datasets are required from each side of the divide to accurately characterize groundwater flow conditions (e.g., flow direction and rate). The maps in the Demonstration and the Annual GWMCA Reports depict a groundwater divide separating the multiunit system on the north-northwest side of the property from the WBSP at the south-southeast side of the property.[19] There is insufficient groundwater elevation data to characterize groundwater flow direction at the multiunit system on the northwest side of the groundwater divide.

The Type I Landfill and LRCP occupy a combined 200-acre footprint and are monitored using a single, multiunit groundwater monitoring system. Groundwater flow conditions are not adequately characterized around the multiunit system boundary. To determine upgradient and downgradient directions and the overall groundwater flow, groundwater elevations must be known around the entire unit boundary. But flow direction cannot be determined around the entire multiunit system boundary because there are no monitoring points along the northwestern

[19] 2017 Annual GWMCA Report Figures B-1 through B-6

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and southeastern boundaries of the system, which each span approximately a mile in length, where groundwater elevation data are reported.

(i) Characterization of Groundwater Quality at the Downgradient Waste Unit Boundary

EPA is proposing to determine that IKEC has failed to comply with the requirements of 40 C.F.R. § 257.91(a)(2) to install wells and conduct sampling that accurately represents the quality of groundwater passing the downgradient waste unit boundary and to monitor all potential contaminant pathways.

In 2016, the multiunit groundwater monitoring system included three background wells and six downgradient wells, three of which are located southwest of the multiunit system and three of which (CF-15-01, CF-15-02, and CF-15-03) are located northeast of it.[20] The 2017 Annual GWMCA Report shows a second groundwater divide at the multiunit system: groundwater flow is depicted to the northeast at the northeastern end of the multiunit system and in the opposite direction, to the southwest, at the southwestern end.[21] This means the northeast boundary of the multiunit system is a downgradient boundary. However, sampling at CF-15-01, CF-15-02, and CF-15-03 were not reported after November 2016. By failing to monitor the northeastern boundary of the multiunit system, IKEC has not met the requirements to characterize downgradient groundwater quality.

Additionally, information provided in the ASDs indicate that the multiunit system is inadequate to monitor multiple units. The ASDs include the statement that, "it would take 120 years for groundwater flowing beneath the Type I Landfill to reach the CCR monitoring wells." In other words, downgradient monitoring wells CF-15-07, CF-15-08 and CF-15-09 do not characterize the quality of groundwater passing the waste unit boundary of the Type I Landfill.

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[20] 2017 Annual GWMCA Report p.5
[21] Demonstration, Figure 6

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Accordingly, EPA is proposing to determine that this multiunit system fails to accurately characterize groundwater quality at the downgradient boundary of the Type I Landfill as required by 40 C.F.R. § 257.91(a) because the wells are too far away.

(ii) Characterization of background

In general, background monitoring wells must be placed hydraulically upgradient of the CCR unit. Alternatively, a determination of background groundwater quality may utilize samples from wells that are not hydraulically upgradient of the CCR unit where, "(i) Hydrogeologic conditions do not allow the owner or operator of the CCR unit to determine what wells are hydraulically upgradient; or (ii) Sampling at other wells will provide an indication of background groundwater quality that is as representative or more representative than that provided by the upgradient wells…" 40 C.F.R. § 257.91(a)(1).

Section 4.2.1 of the Demonstration states, "Due to the geologic setting of the Type I Landfill and LRCP, there were no suitable upgradient groundwater monitoring locations and upgradient monitoring wells were not installed." The Demonstration and the 2018 and 2019 Annual GWMCA Reports contained no groundwater elevation measurements or groundwater flow direction information around the west, north, or northeast boundary of the multiunit system to support this claim.

Background wells CF-15-04, CF-15-05, and CF-15-06 are located southeast of the center of the multiunit system. They are identified as background wells in the Annual GWMCA Reports. In 2018, two wells were added to the multiunit groundwater monitoring system as background wells. These wells, WBSP-15-01 and WBSP-15-02, are located on the other side of the Devil's Backbone groundwater divide from the multiunit groundwater monitoring system. This means the groundwater monitored in them does not flow to the multiunit system and is in a

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groundwater formation that is distinct from the groundwater at the multiunit system. No information is provided that explains how groundwater from these wells is representative of background groundwater quality for the multiunit system, in accordance with the performance standard in 40 C.F.R. § 257.91(a)(1).

The boring logs for background wells WBSP-15-02 and WBSP-15-03[22] show they were both installed through CCR and are contaminated by CCR. 40 C.F.R. § 257.91(a)(1) requires that groundwater monitoring wells be installed to yield groundwater samples that will accurately represent the quality of background groundwater that has not been affected by a CCR unit. The boring logs of these wells indicate that boiler slag is present throughout the well borings; the Demonstration indicates both systems utilize these wells as background wells. EPA is proposing to conclude that wells WBSP-15-02 and WBSP-15-03 are contaminated by CCR and therefore fail to meet the performance standard at 40 C.F.R. § 257.91(a)(1). For this reason, these wells cannot be used as background wells at either the multiunit system or the WBSP.

A further concern is the use of these contaminated wells to conduct the analyses required by 40 C.F.R. § 257.93(h). This provision requires the facility to determine whether there has been a statistically significant increase (SSI) above background levels for each constituent in Appendix III to 40 C.F.R. Part 257, by comparing downgradient concentrations to concentrations in the background wells. Detection of concentrations of the constituents at SSIs serves as evidence that a CCR unit is leaking. Use of monitoring data from contaminated wells in the statistical background dataset for the both the WBSP and the multiunit system may have inflated the statistical background limits used for these comparisons. As a consequence, concentrations detected in the downgradient wells may be compared to an inaccurately high background level,

[22] Demonstration, Appendix B, PDF pp. 76-80.

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potentially masking detection of SSIs. EPA cannot determine at this time whether additional SSIs would have been detected if background groundwater quality had been properly characterized using wells that are not impacted by CCR, but it is possible that appropriate background characterization could have resulted in additional SSIs or SSLs above a groundwater protection standard, resulting in assessment monitoring requirements for the WBSP or additional corrective action requirements for the LRCP.

(b) Alternative Source Demonstrations (ASDs)

If it is determined that there was an SSI over background levels for one or more of the constituents in Appendix III to 40 CFR part 257 at a monitoring well at the downgradient waste boundary, there is an opportunity to complete an ASD to show that a source other than the unit was the cause of the SSI. 40 C.F.R. § 257.94(e)(2). If a successful ASD for an SSI is not completed within 90 days, an assessment monitoring program must be initiated. A successful ASD will demonstrate that a source other than the CCR unit is responsible for the SSI. In order to rebut the site-specific monitoring data and analysis that resulted in an SSI, an ASD requires conclusions that are supported by site-specific facts and analytical data. Merely speculative or theoretical bases for the conclusions are insufficient.

ASDs have been conducted at the multiunit system for SSIs of multiple constituents. EPA is proposing to determine that the ASDs do not provide sufficient evidence that an alternative source exists and is the cause of the SSIs and SSLs, and that the conclusions of the ASDs demonstrate failure of the multiunit system to comply with the performance standard in 40 C.F.R. § 257.91(d). Additionally, IKEC has inappropriately concluded in the ASDs that different CCR units monitored by the same multiunit groundwater monitoring system could be in different

monitoring programs – one in detection monitoring and the other in assessment monitoring – at the same time.

In 2018, SSIs above background levels were identified for pH and boron at the multiunit system. IKEC concluded in an ASD that the SSIs for pH resulted from a source other than the multiunit system (i.e., a faulty pH meter). EPA does not dispute this ASD. In response to the SSIs for boron, IKEC both prepared ASDs and initiated an assessment monitoring program at the multiunit system.[23] All of the ASDs contain the following lines of evidence: historic ash placed below the LRCP is a known source of boron and is hydraulically connected to CF-15-09; boron had been detected near well CF-15-09 seventeen years before operation of the LRCP began; and the long travel time between the Type I Landfill and the southwest border of the multiunit groundwater monitoring systems means detections in CF-15-09 could not have come from the Type I Landfill.

In order to rebut the site-specific monitoring data and analysis that resulted in an SSI, an ASD must be supported by site-specific facts and analytical data. No direct evidence is provided to support a hydraulic connection between CF-15-09 and old historic ash, or that such a connection is sufficiently strong that the LRCP did not contribute to the boron SSIs. Historic data about boron detections may be relevant; however, its relevance raises questions about the ability of CF-15-09 to characterize groundwater quality at the downgradient unit boundary of the LRCP. EPA believes the data presented is not sufficient to support an ASD for the SSIs for boron. However, IKEC initiated assessment monitoring in 2018 for the LRCP, so a determination that the ASDs are invalid would not require further action at the LRCP. Once sampling data are

[23] 2019 Annual GWMCA Report, p. 3

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available from a compliant groundwater monitoring system at the Type I Landfill, IKEC will be able to determine whether corrective action is required at the Type I Landfill.

Appendix E to the 2019 Annual GWMCA Report states, "Based on a successful Alternate Source Demonstration (ASD) (AGES 2019), OVEC determined that the Type I Landfill was not the source of the Boron. Therefore, the Type I Landfill returned to Detection Monitoring in January 2019. As an alternate source for Boron at the LRCP could not be established, the LRCP remains in Assessment Monitoring."

Multiunit groundwater monitoring systems are subject to the same performance criteria in 40 C.F.R. §§ 257.91(a) through (c) as groundwater monitoring systems for individual CCR units. Under 40 C.F.R. § 257.91(d), a multiunit system is a single groundwater monitoring system that monitors a combination of more than one CCR unit. Where a facility has chosen to install a multiunit groundwater monitoring system, the detection of SSIs trigger assessment monitoring for all CCR units covered by that system. 40 C.F.R. §§ 257.91(d), 257. 94(e). Similarly, the detection of SSLs would trigger corrective action for all its CCR units covered by that system. 40 C.F.R. §§ 257.91(d), 257. 95(g).

(c) Completeness of Reports and Clarity of Visual Representation of Data

IKEC has not provided laboratory analytical reports, statistical analyses, or any detailed discussion of the statistical analyses (e.g., statistical method applied, confidence levels, normality test results) in the Annual GWMCA Reports. As a result, these reports fail to include all the monitoring data obtained under 40 C.F.R. §§ 257.90 through 257.98 as required by 40 CFR § 257.90(e)(3).

The purpose of the Annual GWMCA Report is to provide the most recently obtained groundwater monitoring and corrective action information as well as to allow review for

compliance with the requirements. The groundwater monitoring provisions in 40 CFR §§ 257.90 through 257.95 include numerous requirements (e.g., standards for lowest achievable quantitation limits, requirements to analyze unfiltered groundwater samples for total recoverable metals, and performance standards for various statistical methods). It is IKEC's responsibility to demonstrate that they are in compliance with the regulations, and the failure to provide this information in the Annual GWMCA Reports prevents EPA, states, or other stakeholders from evaluating compliance. For example, in Table 3-4 of the 2018 Annual GWMCA Report, it is noted that SSLs were detected in assessment monitoring but were not confirmed by resampling. The CCR regulations do not provide for resampling to confirm SSLs; however, certain statistical methods may inherently include resampling procedures. EPA cannot determine whether the approach used by IKEC complied with the requirements of 40 C.F.R. §§ 257.93 and 257.95 because the statistical analysis conducted is not included in the Annual GWMCA Reports.

Additionally, while the Demonstration has been determined to be complete, visual representation of data has been prepared in a way that makes it difficult to review and assess for compliance. For example, maps are cropped so closely that they are difficult to interpret – the multiunit groundwater monitoring system is not shown in its entirety on any map that also depicts its monitoring wells. Upgradient monitoring wells are not distinguished from downgradient wells and may not be depicted on the same map. Groundwater flow direction arrows are sometimes depicted with no information regarding the sampling data (i.e., date, groundwater elevation measurement locations and contours) that provided the basis for the arrows. Future submittals should include visual representation of data that provide relevant data with appropriate context to be easily reviewed.

As discussed previously, information about monitoring wells CF-15-01, CF-15-02, and CF-15-03 in the multiunit system were not included in the 2018 or 2019 Annual GWMCA Reports. EPA is unable to determine whether the missing information in the reports pertains to sampling data or problems encountered with these wells during sampling events, as would be required by 40 C.F.R. § 257.90(e)(3), or whether it pertains to their removal and decommissioning, as would be required by 40 C.F.R. § 257.90(e)(2). In any case, the 2018 and 2019 Annual GWMCA Reports are missing information required by 40 C.F.R. § 257.90(e) with respect to these wells.

4. Corrective Action Compliance

When groundwater assessment monitoring shows SSLs of any constituent and an alternative source is not identified within 90 days, a facility must undertake several corrective action steps, including conducting an Assessment of Corrective Measures (ACM) and selecting a remedy to address the release. 40 CFR §§ 257.96 through 98. Molybdenum was detected at SSLs during the October 2018[24] assessment monitoring event at the multiunit system. At well CF-15-08, detected levels of molybdenum exceeded the groundwater protection standard of 100 µg/L in October 2018 at 524 µg/L and December 2018 at 429 µg/L. IKEC is therefore subject to corrective action requirements for the LRCP. EPA has reviewed the ACM included as Appendix E5 to the Demonstration, which is a revised ACM dated November 2020.

EPA is proposing to determine that IKEC has failed to comply with several corrective action requirements. It appears that there are not enough wells installed to characterize the release from the LRCP, and IKEC appears to have failed to estimate the mass of the release and to install a monitoring well at the downgradient facility boundary as required by 40 C.F.R. §§

[24] 2018 Annual GWMCA Report, Table 3-4

257.95(g)(1)(i)-(iii). Further, EPA is proposing to determine that the ACM fails to meet all the requirements in 40 C.F.R. 257.96(c). Finally, EPA is proposing to determine that IKEC has failed to select a remedy "as soon as feasible." 40 C.F.R. § 257.97(a).

(a) Characterization of the Release and Site Conditions

Under 40 C.F.R. § 257.95(g)(1), IKEC is required to characterize the nature and extent of the release and any relevant site conditions that may ultimately affect the remedy selected. The characterization must be sufficient to support a complete and accurate assessment of the corrective measures necessary pursuant to 40 C.F.R. §§ 257.96 and 257.97 to effectively clean up all releases from the CCR unit. The requirement to characterize the release includes gathering data to quantify the levels at which constituents are present, quantifying the estimated mass of the release, and installing at least one well at the facility boundary in the direction of contaminant migration. 40 C.F.R. §§ 257.95(g)(1)(i)-(iv). All this work must be completed within 180 days of detecting an SSL of a constituent in Appendix IV to 40 C.F.R. part 257 (such as molybdenum), unless a 60-day extension is warranted. 40 C.F.R. § 257.96(a). Based on the information contained in the ACM, IKEC appears to have met none of these requirements.

The ACM does not indicate that IKEC has placed a well downgradient of the unit at the facility boundary to determine whether contaminants have migrated off-site, as required by 40 C.F.R. § 257.95(g)(1)(iii), and EPA is unable to determine if this requirement has been met based on the Demonstration. Additionally, in the ACM, the bullets that list the objectives of site characterization in Section 5.0 omit the requirement in 40 C.F.R. § 257.95(g)(1)(ii) to estimate the mass of the release, and this information is subsequently missing from the characterization. The ACM also does not discuss efforts to collect data on the levels of constituents in Appendix

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IV to 40 C.F.R. part 257 that are present in the material released, as required by 40 C.F.R. § 257.95(g)(1)(ii).

In October 2018 and December 2018, four additional groundwater monitoring wells were installed downgradient of the LRCP to gather additional data about where contamination had migrated beyond the downgradient waste unit boundary. EPA believes that additional wells may be needed to laterally characterize the nature and extent of the release, particularly because monitoring well CF-19-14 does not seem to be downgradient from the release. Two wells were installed in the shallow aquifer, CF-19-14 and CF-19-15, and two wells were installed in the deeper aquifer, CF-19-08D and CF-19-15D.[25] These wells were first sampled for groundwater quality in March 2019. Also, in March 2019, groundwater elevation measurements were taken at a subset of wells at the facility, all located south of the LRCP. Because groundwater can flow in multiple directions around the unit, the limited number of groundwater elevation measurements resulted in a limited understanding of groundwater flow direction. EPA is proposing to determine that the groundwater flow characterization does not support the conclusion that CF-19-14 is downgradient of CF-19-08, where the molybdenum SSLs were detected. Therefore, EPA believes that CF-19-14 may not be an appropriate well to laterally characterize the nature and extent of the release, in accordance with 40 C.F.R. § 257.95(g)(1).

Section 7.1 of the ACM identified several gaps in data needed to assess corrective measures: 1) development of a model to assess natural attenuation after closure of the LRCP, 2) ongoing sampling to evaluate trends in molybdenum concentrations to support the modeling effort, 3) additional hydraulic testing to support the modeling effort, and 4) additional

[25] 2020 Annual GWMCA Report Figure 1.

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groundwater elevation measurements to support the modeling effort. IKEC has not provided any explanation why these data are needed to select a remedy. However, the data gaps identified appear to focus only on data to conduct groundwater modeling to analyze potential impacts of LRCP closure (i.e., source control) on groundwater concentrations and attenuation of molybdenum (i.e., the facility's preferred remedy, monitored natural attenuation (MNA)). Specifically, these data would focus solely on contaminant concentrations and whether the contaminant plume is stable.

Plume stability is one aspect of the characterization of the nature and extent of the release; it may occur due to dilution and dispersion or it may be due to an attenuation mechanism such as immobilization. No additional geochemical data or data on the presence of chemical states of molybdenum within the aquifer matrix are included in the data gaps identified. These additional chemical data are needed to assess immobilization attenuation mechanisms. Without the chemical data, the primary reason to study plume stabilization would be to assess MNA through dilution and dispersion. As discussed below, MNA through dilution and dispersion does not meet the requirements in 40 C.F.R. § 257.97(b)(4) and is not appropriate for consideration as a primary corrective measure.

Table 6-2 in the ACM indicates that bench-scale treatability testing was needed to fully evaluate certain corrective measures for molybdenum. It is not explained why the bench scale treatability testing could not have been completed and the results included in the ACM. Additionally, no progress on this study is indicated in a Semi-Annual Remedy Selection Progress Report. EPA is proposing to determine that failure to conduct the bench-scale treatability test is a failure to comply with the requirement in 40 CFR § 257.95(g)(1) to characterize the release and

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site conditions sufficiently "to support a complete and accurate assessment of the corrective measures that may affect the remedy ultimately selected."

(b) Assessment of Corrective Measures

An assessment of corrective measures that will "prevent further releases, remediate any releases, and restore affected areas to original conditions" is required. 40 C.F.R. § 257.96. Section 257.96(c) requires an analysis of the effectiveness of potential corrective measures at meeting all requirements and objectives of the remedy required by 40 C.F.R. § 257.97, and that the analysis address at least the criteria listed in 40 C.F.R. § 257.96(c)(1) through (c)(3).

The ACM contains an assessment of the effectiveness of control measures in the narrative in section 6.4. High-level conclusions of the assessment are presented for source control measures in Table 6-1 and for groundwater control measures in Table 6-2. EPA is proposing to determine the ACM does not satisfy the requirements of 40 C.F.R. § 257.96.

The ACM contains conclusions about certain control measures without providing discussion or data to support the conclusions. Some control measures are included that fail to meet other requirements of the CCR Regulations (e.g., closure performance standard in 40 C.F.R. § 257.102(d)(3)), making their inclusion inappropriate. Additionally, some assessments do not seem to accurately reflect the control measure's "effectiveness in meeting all of the requirements and objectives" in 40 CFR § 257.97(b) based on discussions elsewhere in the ACM. IKEC dismisses a number of potential remedies in Table 6-2, but the conclusions in the table are not supported with data or analysis in either the table or the narrative of the report. Finally, there are several internal inconsistencies in the ACM.

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Conclusions without a supporting assessment or data do not constitute "an analysis of the effectiveness of potential control measures." Further, inaccurate assessments in an ACM can ultimately result in selection of a remedy that will not meet the requirements of 40 C.F.R. § 257.97(b).

(i) Assessment of Source Control Corrective Measures

Among other things, remedies must control the source of releases to reduce or eliminate, to the maximum extent feasible, further releases of Appendix IV constituents. 40 C.F.R. § 257.97(b)(3). Three alternatives to achieve this source control are considered in the ACM: dewatering of the pond, an engineered cover system, and excavation of ash. See Table 6-1. Alternative 1 – dewatering the pond – is a necessary step that must be taken to implement either alternative 2 or 3 and should have been included as an element of those alternatives. It does not independently meet the closure requirements for a surface impoundment closing with waste in place in 40 CFR § 257.102(d)(3). Because there is no way for IKEC to comply with the closure requirements in 40 C.F.R. § 257.102 and dewater the pond without then continuing to close the unit by installing an engineered cover system or excavating the ash from the pond, source control Alternative 1 should not have been included in the assessment as an independent source control measure.

(ii) Assessment of Groundwater Control Measures

To meet the requirement in 40 CFR § 257.96(c), the ACM identified the following corrective measures to address molybdenum in groundwater: 1) three in-situ treatment measures (groundwater migration barriers; permeable reactive barriers (PRBs); in-situ chemical stabilization); 2) ex-situ groundwater treatment (pump and treat) through a vertical well system,

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horizontal well system, or a trenching system (treatment technologies considered to be used in conjunction with an ex-situ system were filtration, ion exchange, and adsorbents); and 3) MNA. The technologies are listed in Table 6-2 and are discussed in section 6.4 of the narrative. EPA has preliminarily identified significant noncompliance issues with the assessment of each of these measures.

(A) In-Situ Treatment (migration barriers, PRBs, in-situ chemical stabilization)

Section 6.4.1.1 of the ACM presents conclusions on the performance of multiple in-situ control measures in general terms, without any supporting explanation: "Although migration barriers, PRBs, and in-situ chemical stabilization are proven technologies, conditions at the LRCP would limit the performance of each of these approaches."[26] The potential effectiveness of migration barriers is described as viable, but it is noted that performance could be impacted by periodic flooding from the Ohio River. In Table 6-2 of the ACM, performance of the in-situ measures is assessed as "low" and for MNA it is assessed as "high." Section 6.4.1.1 states that periodic flooding could impact any in-situ technology considered but does not cite impacts of flooding on MNA or explain why the performance of MNA would not be impacted.

Reliability (one of the required factors in 40 CFR § 257.96(c)) is assessed in section 6.4.2.1. This section notes that PRBs are typically a reliable technology but concludes that reliability is only "medium," because maintaining adequate reagent concentrations at depth over time in PRBs is challenging. In essence, IKEC has downgraded the reliability of this technology based on factors that are not appropriately considered under this criterion.

[26] ACM, p. 17

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The requirement is to assess the reliability inherent to the technology itself and to consider site-specific circumstances that affect that reliability. 40 C.F.R. § 257.96(c)(1). Any active treatment technology could perform poorly with inadequate maintenance or poor design. Any identified, credible reliability issues should be based on site-specific circumstances that present particular challenges that would hamper proper design and implementation and affect reliability (e.g., fluctuations in groundwater flow direction or lack of accessible confining layer into which to tie the PRBs). No such site-specific circumstances are discussed. This lack of explanation does not comply with 40 C.F.R. § 257.96(c), which specifies that the assessment of control measures "must include an *analysis* of the effectiveness of potential corrective measures" (emphasis added) according to the listed criteria. Mere unsupported conclusions cannot meet this standard.

The ease of implementation (another required criterion in 40 C.F.R. § 257.96(c)) of all three of the in-situ groundwater remedial technologies is assessed together as "low" in section 6.4.3.1. The assessment is that they would be difficult "due to the significant amount of time, effort and disturbance required at the LRCP…" While one site-specific issue (construction to the 40-foot depth to a confining layer) supports the low assessment for migration barriers and PRBs, no site-specific factors are discussed for in-situ chemical stabilization. The ACM does not explain why any particularly difficult construction would be required for in-situ chemical stabilization and provides no other explanation for its low assessment. The last sentence of this section notes that ease of implementation may "…require less time and effort…" for in-situ chemical stabilization than for a migration barrier or PRBs. However, this conflicts with the conclusions in Table 6-2, which assesses those three technologies equally with respect to ease of implementation (i.e., low).

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EPA expects that an assessment of ease of implementation will include discussion of site-specific circumstances that may impact the ability to implement the remedy, rather than the time and effort required to do so, which seem to amount to consideration of cost (except for time discussed in the context of 40 C.F.R 40 § 257.96(c)(2)). As an example, the ability to implement a corrective measure could be affected by topographic features (e.g., a forest or a wetland) that would preclude or make difficult proper placement of injection wells needed for in-situ chemical stabilization. The ACM failed to provide this supporting analysis.

(B) Ex-situ Treatment

The assessment of ex-situ treatment alternatives to address groundwater contamination also lacks any supporting detail and analysis. Section 6.4.1.2 of the ACM assesses ex-situ groundwater treatment with extraction through vertical wells most favorably of any ex-situ control measure, and of any groundwater control measure. EPA's review identified some logical inconsistencies, although each criterion in 40 C.F.R. § 257.96(c) was included.

In section 6.4.1.2, the ACM states that iron content in the groundwater would affect the performance of either horizontal or vertical extraction wells, but no data on iron content of groundwater at the site is cited or otherwise provided.

The ACM also inaccurately concludes the expected performance of trench systems is "high." This is not supported by the data in the ACM, because trenches are most often used in a shallow unit. The aquifer at issue is between 15 to 40 feet below ground surface (bgs), which represents the practical limitation of the depth at which trenching systems can be used to extract groundwater. The assessment of the performance of trenching systems as high is also

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inconsistent with section 6.4.1.2, which states that, "Although these depths are not ideal for a trench, they do not preclude the use of a trench at the LRCP."

In section 6.4.5.2, the potential for cross-media impacts from ex-situ groundwater corrective measures is assessed with just the following sentence: "Well and trench systems pose a moderate risk of cross-media impacts." No additional discussion or information is provided. In addition to lacking supporting data and analysis, the conclusion of the assessment (i.e., "medium," in Table 6-2) is inconsistent with the assessment's conclusion that the risk of cross-media impacts from MNA is low, because the cross-media impacts from MNA are expected to be significantly greater than those from ex-situ treatment of groundwater. As discussed later in this document, the only mechanism identified for MNA at this site is dispersion and dilution; in essence, this amounts to cross-media transfer of contamination from groundwater to surface water at this location.

(C) Monitored Natural Attenuation (MNA)

MNA refers to reliance on natural attenuation processes to achieve corrective action objectives within a time frame that is reasonable compared to that offered by other, more active methods. The "natural attenuation processes" at work in such a remediation approach generally include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or groundwater.[27]

EPA is proposing to determine that MNA in the ACM fails to meet the requirements of 40 C.F.R. § 257.97. Specifically, MNA through dispersion and dilution as a primary mechanism

[27] "Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action and Underground Storage Tank Sites," April 1999, p. 3

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at this site fails to be protective of human health and the environment and remove from the environment as much of the released contaminated material as feasible as required under 40 C.F.R. §§ 257.97(b)(1) and (4). Additionally, the assessment of MNA is skewed because IKEC considered different MNA mechanisms under each 40 C.F.R. § 257.96(c) criterion, only considering the highest performing mechanism, even in cases where there was no evidence the mechanism could occur at the site. Finally, the ACM contains no data to support the occurrence of immobilization of molybdenum at Clifty Creek.

(1) MNA Guidance in other EPA cleanup programs

EPA has extensive experience with MNA in environmental cleanup programs. Based on that experience, EPA considers the scientific principles of chemical and physical behavior of constituents in such guidance to be relevant to corrective action at CCR units. EPA believes that the 2015 "Use of Monitored Natural Attenuation for Inorganic Contaminants in Groundwater at Superfund Sites" ("2015 MNA Guidance") contains relevant information, because the regulated constituents are inorganic contaminants and the focus of the CCR corrective action program is on groundwater cleanup. While scientific aspects of the 2015 MNA Guidance (e.g., the behavior of inorganic contaminants in the environment or the ways in which specific MNA mechanisms work) are relevant, EPA acknowledges that policy aspects of the 2015 MNA Guidance may not be relevant. As an example, using a step-by-step tiered analysis approach to screen sites for MNA for the purposes of cost-effectiveness[28] would be inappropriate[29] for CCR corrective action given the prohibition against consideration of costs and the deadline in 40 CFR § 257.96(a) to complete the ACM.

[28] "Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action and Underground Storage Tank Sites," April 1999, pp. 4-5
[29] USWAG decision, section IV.B.4

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Mass reduction through degradation generally is not a viable process for most inorganic contaminants in groundwater, except for radioactive decay. Constituents in Appendix IV to 40 C.F.R. part 257 are atoms, and atoms do not break down or degrade through any naturally occurring process unless they are radioactive. Thus, while MNA can reduce the concentration or mobility of inorganic contaminants in groundwater if immobilization occurs through adsorption or absorption to subsurface soils, it does not remove the contaminants from the environment. MNA, therefore, would not perform well with respect to the requirement in 40 C.F.R. § 257.97(b)(4), which requires that remedies "remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible."

Inorganic contaminants persist in the subsurface because, except for radioactive decay, they are not degraded by the other natural attenuation processes.[30] Often, however, inorganic contaminants may exist in forms that have low mobility, toxicity, or bioavailability such that they pose a relatively low level of risk. Therefore, natural attenuation of inorganic contaminants is most applicable to sites where immobilization is demonstrated to be in effect and the process/mechanism is irreversible.[31] Immobilization that is not permanent would require ongoing monitoring in accordance with 40 C.F.R. § 257.98(a)(1) as long as immobilized constituents remain in the aquifer matrix.

Dilution and dispersion reduce concentrations through dispersal of contaminant mass rather than destruction or immobilization of contaminant mass.[32] Consequently, these

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[30] This is in contrast to organic compounds, comprised of multiple elements, which may react or degrade to their constituent elements or form other, less harmful compounds.
[31] "Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action and Underground Storage Tank Sites," April 1999, p. 9
[32] "Use of Monitored Natural Attenuation for Inorganic Contaminants in Groundwater at Superfund Sites," August 2015, p. 14

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mechanisms do not meet the requirement at 40 C.F.R. § 257.97(b)(4) to remove from the environment as much of the contaminated material as is feasible, and they may not meet the requirement at 40 C.F.R. § 257.97(b)(1) to be protective of human health and the environment. Note that this is also consistent with EPA's long-standing policy that dilution and dispersion are generally not appropriate as primary MNA mechanisms.[33]

In order to conduct the assessment required by 40 C.F.R. § 257.96(c), evaluation of MNA as a corrective measure requires analysis of site-specific data and characteristics that control and sustain naturally occurring attenuation. "It is necessary to know what specific mechanism (e.g., what type of sorption or reduction and oxidation reaction) is responsible for the attenuation of inorganics so that the stability of the mechanism can be evaluated. [...] Changes in a contaminant's concentration, pH, oxidation and reduction potential (ORP), and chemical speciation may reduce a contaminant's stability at a site and release it into the environment."[34] Determining the existence, and demonstrating the irreversibility, of MNA mechanisms is necessary to evaluate the performance, reliability, ease of implementation, and the time required to begin and complete the remedy. 40 C.F.R. §§ 257.96 (c)(1) and (c)(2). This information would ultimately be necessary to show that MNA meets the requirements of 40 C.F.R. § 257.97(b).

(2) Assessment of MNA in the ACM

The ACM has conflated the assessment of MNA through dilution and dispersion with MNA through immobilization. While MNA through dilution and dispersion performs well with respect to certain criteria (e.g., reliability), it fails to perform well according to other criteria

[33] "Use of Monitored Natural Attenuation for Inorganic Contaminants in Groundwater at Superfund Sites," August 2015, p. 14

[34] "Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action and Underground Storage Tank Sites," April 1999, p. 8

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(e.g., cross-media impacts) or to remove sufficient contaminated material from the environment as required under 40 C.F.R. § 257.97(b)(4). Consequently, its consideration as a primary remedy is inappropriate. By contrast, MNA through immobilization may be assessed favorably with respect to some criteria (e.g., ease of implementation), but the ACM provides no evidence this mechanism is occurring at this site for molybdenum. In the absence of such data, MNA through immobilization should necessarily be assessed poorly with respect to other criteria (e.g., performance, reliability). By considering the mechanism that assesses higher under each criterion, the ACM has skewed the assessment of MNA more favorably than is allowed by the regulation and supported by site-specific data.

Section 6.4.1.1 of the ACM assesses the performance of MNA. The ACM identifies three MNA mechanisms that could affect molybdenum (adsorption, precipitation, and dispersion). The ACM presents limited data obtained from three wells during 2018 for pH and ORP, which impact the likelihood of inorganic metals to precipitate and absorb or adsorb onto subsurface soils. The data indicate that, during 2018, pH at these wells was relatively stable (6.5 to 7.5 standard units), which would only weakly support adsorption/precipitation, and that ORP varied (-50.4 mV to 335 mV), which indicates fluctuation in favorability of MNA. The pH data gathered at other wells and during other detection and assessment monitoring events are not included in the discussion. The ACM states that dispersion would likely be a major factor in MNA, given periodic flood events and groundwater flow reversals.

MNA is assessed in section 6.4.2.1 as reliable, and the reason provided is that MNA relies on natural processes. This is not a logical conclusion, because when natural conditions vary, natural processes vary. This is acknowledged in the same paragraph, when it is noted that geochemical changes in the groundwater may affect the performance of MNA. "Geochemical

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changes in groundwater could significantly impact the effectiveness of MNA, which could lead to the need to implement other remedial measures at the LRCP."[35] Geochemical changes have been documented, specifically ORP varied (-50.4 mV to 335 mV) during 2018 at the three wells. Therefore, assessment of MNA through adsorption or precipitation mechanisms as reliable is inconsistent with the site-specific data.

MNA through dispersion or dilution can be reliable, but it should not have been assessed favorably with respect to performance at achieving requirements in 40 C.F.R. § 257.97(b). As noted above, the constituents in Appendix IV to part 257 (i.e., molybdenum) are atoms, and atoms do not degrade in nature. Dispersion or dilution serves to expand the area of contamination, albeit at lower concentrations. This spread of groundwater contamination is precisely the type of environmental impact the CCR corrective action program was developed to address. Because dilution and dispersion do not degrade the contaminants or change them to a less toxic form and do not remove them from the environment, MNA through dilution and dispersion fails to comply with 40 C.F.R. § 257.97(b)(4) and may not be protective of human health and the environment as required by 40 C.F.R. § 257.97(b)(1).

The ease of implementation of MNA is assessed in section 6.4.3.1 as the easiest of all the technologies, primarily because IKEC believes there is a sufficient number of monitoring wells at the LRCP. While MNA is a relatively easy remedy to implement, EPA is proposing to conclude that the existing well network is insufficient to monitor performance of an MNA remedy. If MNA were to be selected as part of a remedy, monitoring groundwater chemistry throughout the plume where attenuation is occurring would be required to comply with 40 C.F.R.

[35] ACM p. 19

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§ 257.98(a)(1). See also the 2015 MNA guidance.[36] The four additional wells installed in 2018 do not provide a sufficient system to laterally and vertically determine the extent of the plume, nor to monitor within the plume the variations in geochemistry noted throughout the ACM that may impact the effectiveness of attenuation processes. Additional wells would be required, particularly wells that are screened deeper in the aquifer at CF-15-09 and placed laterally between CF-19-14 and CF-19-15.

Section 6.4.5.1 states that "MNA poses no significant cross-media impact potential," and Table 6-2 therefore assesses the cross-media impacts of MNA as low. These conclusions are contradicted by other statements in the ACM, including the statement in section 6.4.1.1 that dispersion would likely be a major factor in MNA. Dispersion at the site results in migration of contamination in groundwater to the Ohio River (surface water). Impacts from groundwater to surface water are cross-media impacts[37] and MNA through dispersion has the highest cross-media impact of all groundwater corrective measures considered.

40 C.F.R. § 257.96(c)(1) also requires assessment of how well control measures will control exposure to residual contamination. Instead, the ACM assesses potential impacts from exposure to residual contamination. See Table 6-2 and section 6.4.6.1, where MNA is assessed as low. This conclusion is unsupported by data or analysis.

EPA is proposing to conclude that IKEC has failed to demonstrate that the facility is in compliance with the requirements of 40 C.F.R. § 257.96 to complete an ACM for the units in the multiunit groundwater monitoring system. This finding is primarily based upon failure to assess

[36] 2015 MNA Guidance p.33
[37] "Municipal Solid Waste Landfill Criteria–Technical Manual: Chapter 5, Subpart E–Ground-Water Monitoring and Corrective Action," p. 296

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corrective measures in compliance with the required criteria in 40 C.F.R. § 257.96(c) using site-specific data gathered in the characterization required by 40 C.F.R. § 257.95(g)(1).

(iii) Failure to select a remedy as soon as feasible

EPA is proposing to determine that IKEC has not selected a remedy as soon as feasible, as required by 40 C.F.R. § 257.97(a). First, although EPA disagrees that the data identified in section 7.1 of the ACM are necessary prerequisites to selection of a remedy, and that the data identified in table 6-2 of the ACM could not have been gathered prior to completion of the ACM, the more relevant point is that IKEC appears to have made no attempt to gather these data because the ACM was completed in September 2019. Second, because the ACM identified corrective measures that would meet the standards in 40 C.F.R. § 257.97(b), it was feasible to select a remedy as soon as December 2019. Finally, IKEC has stated an intention to delay selection of a remedy until after closure of the LRCP, which is inconsistent with 40 C.F.R. § 257.97(a).

The CCR regulations require that a facility must select a remedy that is based on the results of the ACM and that meets the standards in 40 C.F.R. § 257.97(b) "as soon as feasible." 40 C.F.R. § 257.97(a). The regulations applicable to corrective action establish a series of time frames that typically operate consecutively. Relevant here, once corrective action is triggered a facility has 180 days to complete the ACM.[38] At that point the obligation to select a remedy is triggered.[39] See, 40 C.F.R. §§ 257.95(g), 257.96(a), 257.97(a). In other words, once the 180 days to complete the ACM have passed, a facility must select a remedy "as soon as feasible." As

[38] 40 C.F.R. § 257.96(a) allows for a demonstration that additional time is needed, up to 60 days, to complete the ACM.

[39] The remedy selection process begins with a public meeting to discuss findings of the ACM and at least 30 days to address public input received, in accordance with 40 C.F.R. § 257.96(e).

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previously explained, EPA interprets the term "feasible" to mean ''capable of being done or carried out'' (Merriam website (https://www.merriam-webster.com/dictionary/feasible)) and ''possible to do and likely to be successful'' (Cambridge English Dictionary https://dictionary.cambridge.org/us/dictionary/english/feasible)). 85 Fed Reg. 53542. As a practical matter, this means that a facility must be able to show progress toward selecting a remedy once the 180 days have passed or demonstrate why it was not feasible to have done so. Based on the documentation provided, EPA is proposing to determine that it was feasible to have selected a remedy that met the standards in 40 C.F.R. § 257.97(b) as early as December 2019 and that IKEC failed to comply with this requirement.

The Demonstration states that the ACM was completed in September 2019. A public meeting to discuss the contents of the ACM in accordance with 40 C.F.R § 257.96(e) was held in November 2019.[40] As of November 30, 2020, IKEC still had not selected a remedy.

Section 7.1 of the ACM identified several data gaps: 1) development of a model to assess natural attenuation after closure of the LRCP, 2) ongoing sampling to evaluate trends in molybdenum concentrations to support the modeling effort, 3) additional hydraulic testing to support the modeling effort, and 4) additional groundwater elevation measurements to support the modeling effort. IKEC has not provided any explanation why these data are needed to select a remedy. As discussed previously, the data gaps identified in section 7.1 seem to focus on data to further assess MNA after closure of the LRCP, specifically MNA through dispersion. MNA through dispersion does not comply with the requirements in 40 C.F.R. § 257.97(b)(4), and it may not comply with requirements in 40 C.F.R. § 257.97(b)(1). Because MNA through

[40] Demonstration p. 3-3

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dispersion is not a compliant, primary remedy, EPA believes it was feasible to select a remedy prior to gathering the data identified in section 7.1 of the ACM.

An additional data gap was identified in Table 6-2 in the ACM, bench-scale treatability testing for molybdenum. The ACM indicates that study was needed to fully evaluate certain corrective measures for molybdenum. However, as stated previously, EPA believes this information was required in the ACM itself and should not have resulted in additional time to select a remedy.

Of greater significance, however, IKEC has presented no evidence of any progress toward collecting any of these data. This is confirmed by the June 2020 Semi-Annual Remedy Selection Progress Report, which reports no progress in collecting these data and instead discusses continued assessment monitoring and continued efforts to plan closure of the LRCP. These activities are not necessary prerequisites to selecting a remedy and do not otherwise demonstrate progress toward remedy selection. Neither the Demonstration nor the 2019 Annual GWMCA Report describes any additional work, such as work to characterize site conditions that could ultimately affect a remedy, that would indicate any progress toward selecting a remedy. According to the June 2020 Semi-Annual Remedy Selection Progress Report, no progress toward selection of a remedy was reported.

Although, as discussed in the previous section, much of the analysis in the ACM was inappropriately skewed in favor of MNA, the ACM nevertheless identified corrective measures that could meet all the standards in 40 C.F.R. § 257.97(b). These include, for example, excavation of ash and ex-situ treatment of groundwater. It is not apparent why it was not "feasible" for IKEC to select one or more of these measures as a remedy. Moreover, given the existence of these measures, 40 C.F.R. § 257.97(a) does not allow IKEC to delay selection of a

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remedy under the guise of collecting additional data that are not needed to select a remedy. This is particularly true when the focus of additional data collection is to study a remedy (MNA through dilution and dispersion). As EPA has explained above, as a primary remedy at this site, MNA through dilution and dispersion does not meet certain requirements under 40 C.F.R. § 257.97(b).

Finally, statements in section 6.3 of the ACM appear to indicate that IKEC intends to delay remedy selection and implementation of corrective action until after closure of the LRCP,

> "...groundwater quality near the LRCP is anticipated to significantly improve over time as a result of planned closure activities. Therefore, a flexible and adaptive approach to groundwater remediation that begins with post-closure groundwater monitoring at the unit is planned. During the post-closure monitoring period, the positive impacts of closure and the effects of natural attenuation on groundwater quality will be fully evaluated. The need for more active remedial measures (as discussed below) will be determined after sufficient post-closure groundwater quality data has been collected and evaluated."

This intention is confirmed in the June 2020 Semi-Annual Remedy Selection Progress Report, which seems to inappropriately indicate progress toward closure is progress toward remedy selection:

> "The initial closure methods described above will reduce the potential for releases and migration of CCR constituents. Groundwater assessment monitoring as required by 40 C.F.R. § 257.96(b) will continue until a remedy is selected and implemented. The monitoring will be conducted to track changes in groundwater conditions as a result of these closures and operational changes. These data will also be considered in the selection and design of a remedy in accordance with 40 C.F.R. § 257.97."[41]

Closure of a CCR unit is not progress toward selection of a remedy. Delaying remedy selection until after closure of the LRCP does not comply the requirement to select a remedy "as soon as feasible." 40 C.F.R. § 257.97(a).

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[41] Semi-Annual Selection of Remedy Progress Report, June 2020, Section 4.1.

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IV. Proposed Date to Cease Receipt of Waste

EPA is proposing that IKEC must cease receipt of waste within 135 days of the date of the Agency's final decision (i.e., the date on which the decision is signed). EPA is further proposing that, under certain circumstances described below, EPA could authorize additional time for IKEC to continue to use the impoundments to the extent necessary to address demonstrated grid reliability issues, if any, provided that IKEC submits a planned outage request to PJM within 15 days of the date of EPA's final decision and IKEC provides the PJM determination disapproving the planned outage and the formal reliability assessment upon which it is based to EPA within 10 days of receiving them.

The regulations state that, when EPA denies an application for an extension, the final decision will include the facility's deadline to cease receipt of waste, but they do not provide direction on what the new deadline should be. 40 C.F.R. § 257.103(f)(3). EPA is proposing to set a new deadline for IKEC to cease receipt of waste that would be 135 days from the date of the final decision on IKEC's Demonstration. This would provide IKEC with the same amount of time that would have been available to the facility had EPA issued a denial immediately upon receipt of the Demonstration (i.e., from November 30, 2020, when EPA received the submission, to April 11, 2021, the regulatory deadline to cease receipt of waste). This amount of time thus puts the facility in the same place it would have been had EPA immediately acted on the Demonstration and therefore adequately accounts for any equitable reliance interest IKEC may have had after submitting its Demonstration. Moreover, as discussed further below, this date should provide IKEC with adequate time to coordinate with and obtain any necessary approvals from PJM for any outage of the coal-fired boiler that may be necessary. This proposed deadline

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for IKEC to cease receipt of waste is the same as the proposed effective date of EPA's final decision (*see* Unit VI below).

Given that this proposed deadline (135 days from the date of EPA's final decision) is sooner than the deadline requested by IKEC, EPA understands that it is likely that the coal-fired boilers associated with the CCR units will temporarily need to stop producing waste (and therefore power) until either construction of the alternative disposal capacities is completed and commercially operational or some other arrangements are made to manage its CCR and/or non-CCR wastestreams. *See* discussion of adverse effects above in Unit III.B. In IKEC's Demonstration it noted that if the requested deadline were not granted, it "might" affect the reliability of the electricity grid. IKEC provided no information or evidence to support this statement. EPA does not have independent evidence showing that the temporary outage of the coal-fired boiler at this facility would affect the reliability of the grid.

This facility operates as part of the PJM system, which is the largest competitive market for electric power in the United States. PJM is an RTO that is part of the Eastern Interconnection grid. PJM currently has a significant amount of excess generating capacity, and consequently, a relatively large reserve margin. A reserve margin is a measure of the system's generating capability above the amount required to meet the system's peak load.[42] PJM's target reserve margin[43] for the region is now 14.7%.[44] PJM's actual reserve margin in 2018 was more than

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[42] Reserve margin is defined as the difference between total dependable capacity and annual system peak load (net internal demand) divided by annual system peak load.

[43] The target reserve margin, also known as the Installed Reserve Margin, is "the percent of aggregate generating unit capability above the forecasted peak load that is required for adherence to meet a given adequacy level." Page 52, https://www.pjm.com/-/media/committees-groups/committees/mc/2020/20201119/20201119-cac-2-2020-installed-reserve-margin-study-results-report.ashx.

[44] North American Electric Reliability Corporation, Summer 2021 Reliability Assessment, page 44 (where "Reference" Reserve Margin Level refers to PJM's Installed Reserve Margin), https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC%20SRA%202021.pdf.

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twice that, at 32.8%; in 2019 it was 29%. The anticipated reserve margin for 2021 is projected to be almost 34%.

The significant exceedance of PJM's existing target reserve margin, combined with scheduled new capacity coming online into the market, suggests that the temporary outage at Clifty Creek would not adversely affect resource adequacy requirements. EPA also has not seen any information to indicate that an extended planned outage at Clifty Creek would trigger local reliability violations.[45] Additionally, especially with the advance notice, there are a wide array of tools available to utilities, system operators, and State and Federal regulators to address situations where the outage of a generating unit might otherwise affect local electric reliability conditions.

Nonetheless, EPA is sensitive to the importance of maintaining enough electricity generating capacity to meet the region's energy needs, including meeting specific, localized issues. EPA understands that it is possible that in some instances temporarily taking generating units (including coal-fired units) offline could have an adverse, localized impact on electric reliability (e.g., voltage support, local resource adequacy), although IKEC has presented no evidence that such is the case with this facility.

If a generating asset were needed for local reliability requirements, the grid operator (e.g., PJM) might not approve a request for a planned outage. In such instances, the owners/operators of the generating unit could find themselves in the position of either operating in noncompliance with RCRA or halting operations and thereby potentially causing adverse reliability conditions.

[45] A local reliability violation might occur, for example, if transmission line constraints limit the amount of power that can get to an area from plants outside that area.

EPA is obligated to ensure compliance with RCRA to protect human health and the environment. Where there is a conflict between timely compliance and electric reliability, EPA intends to carefully exercise its authorities to ensure compliance with RCRA while taking into account any genuine, demonstrated risks to grid reliability identified through the process established by PJM that governs owner/operator requests for planned outages and/or deactivation.[46]

Accordingly, EPA is proposing to rely on established processes and authorities used by PJM to determine whether a planned outage necessary to meet the new deadline would cause a demonstrated grid reliability issue.

PJM is responsible for coordinating and approving requests for planned outages of generation and transmission facilities, as necessary, for the reliable operation of the PJM RTO.[47] In PJM, power plants are to submit a request at least 30 days in advance of a planned outage to allow PJM to evaluate whether the resource is needed to maintain grid reliability. PJM will grant the request unless it determines that the planned outage would adversely affect reliability.

If PJM approves a planned outage request, the outage may proceed and there would be no reason to expect that the outage would affect reliability. However, if PJM disapproves a planned outage, the procedure is for the PJM member to submit a new planned outage request for PJM to evaluate (with potential proposals to mitigate previously indicated reliability violations with the prior request). This process is repeated until the generating facility submits an acceptable request. The PJM member may also request PJM's assistance in scheduling a planned outage.

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[46] *See, e.g.*, PJM Manual 10: Pre-Scheduling Operations, Revision: 39, Effective Date: November 19, 2020 (Section II), available at https://www.pjm.com/~/media/documents/manuals/m10.ashx.

[47] *See*, PJM Manual 10: Pre-Scheduling Operations, Revision: 39, Effective Date: November 19, 2020 (Section II), available at https://www.pjm.com/~/media/documents/manuals/m10.ashx.

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PJM may rely on different bases in determining whether to deny a request for a planned outage. For example, a denial may be issued because of timing considerations taking into account previously approved planned outage requests, in which case the EPA would expect the plant owner to work with PJM to plan an outage schedule that can be approved by PJM and also satisfies the plant owner's RCRA obligations, without regard to any cost implications (e.g., in meeting any contractual obligations with third parties) that may result for the plant owner under a revised proposed outage schedule.

Alternatively, however, in some cases, PJM might deny a request should it determine that the planned outage could not occur without triggering operational reliability violations. In such cases, the system operator might determine that the generating unit would need to remain in operation until remedies are implemented. As set forth above, IKEC has presented no evidence that such is the case with this facility.

For Clifty Creek, EPA is proposing to rely on PJM's procedures for reviewing planned maintenance outage and similar requests. Accordingly, EPA is proposing that, if PJM approves IKEC's planned outage request, EPA would not grant any further extension of the deadline to cease receipt of waste (i.e., the deadline would be 135 days from the date of EPA's final decision). If, however, PJM disapproves IKEC's planned outage request based on a technical demonstration of operational reliability issues, EPA is proposing that, based on its review of that disapproval and its bases, EPA could grant a further extension (i.e., beyond 135 days from the date of EPA's final decision). EPA is further proposing that such a request could only be granted if it were supported by the results of the formal reliability assessment(s) conducted by PJM that established that the temporary outage of the boiler during the period needed to complete construction of alternative disposal capacity would have an adverse impact on reliability. In such

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a case EPA is proposing that, without additional notice and comment, it could authorize continued use of the impoundments for either the amount of time provided in an alternative schedule proposed by PJM or the amount of time EPA determines is needed to complete construction of alternative disposal capacity based on its review of the Demonstration, whichever is shorter. EPA is further proposing that a disapproval from PJM without a finding of technical infeasibility for demonstrated reliability concerns would not support EPA's approval of an extension of the date to cease receipt of waste because any concern about outage schedules and their implications for plant economics could be resolved without an extension of RCRA compliance deadlines (e.g., through provision of replacement power and/or capacity; rearranging plant maintenance schedules; reconfiguration of equipment).

To obtain an extension, EPA is proposing that IKEC must submit a request for an outage to PJM within 15 days of the date of EPA's final decision. To avoid the need for serial requests and submissions to PJM, EPA is proposing to require IKEC to contact PJM and request assistance in scheduling the planned outage so that IKEC and PJM can determine the shortest period of time during an overall planned outage period in which the generating unit must be online to avoid a reliability violation. EPA expects that IKEC and PJM would plan the outage(s) and return-to-service periods – and any other needed accommodations – in ways that minimize the period of actual plant operations.

Finally, to obtain an extension from EPA, IKEC must submit a copy of the request to PJM and the PJM determination (including the formal reliability assessment) to EPA within 10 days of receiving the response from PJM. EPA would review the request and, without further notice and comment, issue a decision.

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One hundred and thirty-five days should normally provide adequate time to obtain a decision from PJM. According to the PJM Manual 10 (at page 17), the normal process for obtaining approval for a planned outage is 30 days. One hundred and thirty-five days should also provide sufficient time to accommodate multiple requests, if necessary, to obtain approval. However, EPA solicits comment on whether 135 days from the date of the final decision provides sufficient time to accommodate the normal process of obtaining approval for a planned outage.

V. Conclusion

In conclusion, EPA is proposing to deny IKEC's request for an alternative cease receipt of waste date for the CCR surface impoundments, WBSP and LRCP, located at the Clifty Creek Power Station in Madison, Indiana. EPA is proposing that IKEC cease receipt of waste and initiate closure no than 135 days from the date of EPA's final decision.

EPA is proposing to deny IKEC's extension request based on its proposed determination that Clifty Creek Power Station has failed to demonstrate that the facility is in compliance with all the requirements of 40 C.F.R. subpart D. 40 C.F.R. § 257.103(f)(1)(iii). Based on the information provided, it appears that the closure of both the WBSP and the LRCP does not meet the technical requirements of 40 C.F.R. § 257.102(d). Additionally, EPA has preliminarily identified concerns that the groundwater monitoring networks for both the WBSP and the LRCP fail to meet the standards found in 40 C.F.R. §§ 257.90 and 257.91, particularly the standards with respect to the placement of background wells. Lastly, EPA has identified several concerns with the ongoing corrective action activities at the LRCP.

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Finally, due to the nature of the noncompliance EPA has preliminarily identified at Clifty Creek, EPA is proposing to issue a denial rather than a conditional approval. As discussed in greater detail in the proposed H.L. Spurlock Power Station decision, EPA is proposing that a conditional approval may be appropriate in situations where the actions necessary to bring the facility into compliance are straightforward and the facility could take the actions well before its requested deadline (or the alternative deadline that EPA has determined to be warranted). But in the case of Clifty Creek, the noncompliance EPA has identified involves more complicated technical issues, where the specific actions necessary to come into compliance cannot be easily identified and/or cannot be implemented quickly. As discussed previously EPA is proposing to determine that a significant component of the alternative disposal capacity IKEC intends to construct is out of compliance with several regulatory provisions, including the groundwater monitoring and closure requirements. Although EPA has preliminarily identified options that would be consistent with the regulations (see Section III. E. 1. b), EPA cannot determine precisely how those options might function with all of the other components of the alternative disposal system or even whether they are genuinely feasible in light of site conditions. Nor could EPA conclude that IKEC could come into compliance with all the groundwater monitoring and corrective action requirements before its requested deadline. Moreover, EPA continues to believe that where there is affirmative evidence of harm at the site, such as where a facility has delayed corrective action, EPA cannot grant additional time for the impoundment to operate without some evidence that these risks are mitigated.

VI. Effective Date

EPA is proposing to establish an effective date for the final decision on IKEC's demonstration of 135 days after the date of the final decision (i.e., the date that the final decision

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is signed). EPA is proposing to align the effective date with the new deadline that EPA is proposing to establish for IKEC to cease receipt of waste. EPA is doing so for all of the reasons discussed as the basis for proposing to establish the new cease receipt of waste discussed in Section IV of this document.

January 11, 2022
Date

Barry N. Breen
Acting Assistant Administrator

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